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DIVISION OF BOTANY AND PLANT PATHOLOGY

TWENTY-NINTH ANNUAL REPORT OF THE CANADIAN PLANT DISEASE SURVEY 1949

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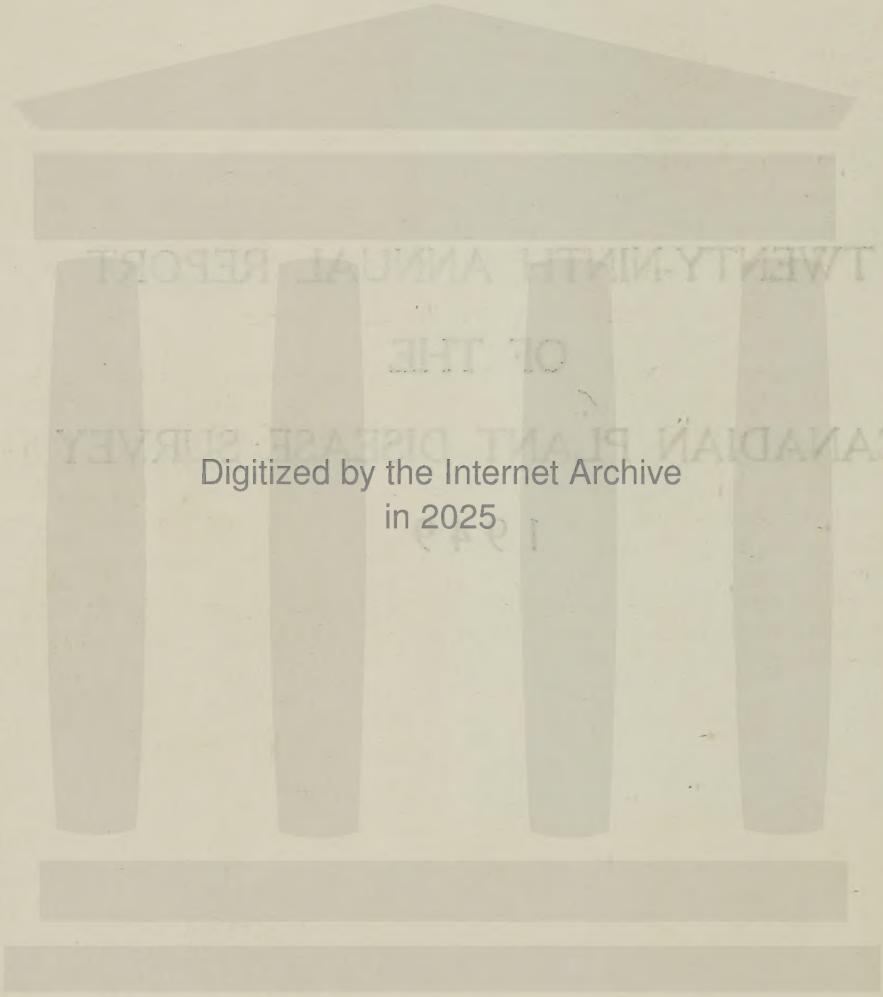

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FOREWORD

Several special contributions again occur in this report. In the introduction appear "Notes on Plant parasitic nematodes in Canada" by A.D. Baker and "Plant diseases in Newfoundland" by J.F. Hockey. The latter account is especially welcome as little information on the disease situation in Newfoundland, Canada's newest province, is available to workers in the rest of Canada. The particularly virulent form of potato wart that appears to occur in Newfoundland occasions concern and it is hoped that resistant varieties will soon be found to help the Newfoundland grower. Its presence emphasis the necessity of maintaining strict quarentine on the movement of potatoes from the island.

In the body of the text appear the following special reports: "Rust nurseries in Canada in 1949" and "Physiologic races of cereal rusts in Canada in 1949" by T. Johnson, B. Peturson, A.M. Brown, and G.J. Green, on flax diseases by Prof. T.C. Vanterpool for Saskatchewan and W.E. Sackston for Manitoba, "Soybean diseases in southwestern Ontario in 1949" by A.A. Hildebrand, "Sunflower diseases in Manitoba in 1949" by W.E. Sackston, and on tobacco diseases by L.W. Koch.

Principal contributors outside of the Division were Mr. S.F. Clarkson; Mr. O. Caron and Mr. D. Leblond; Mr. F. Godbout and Mr. E. Lavallée; Dr. J.E. Jacques; Dr. J.D. MacLachlan and co-workers; Prof. T.C. Vanterpool; Dr. A.W. Henry; Mr. W. Lobay; Mr. W.R. Foster and Mr. I.C. MacSwan; and all the District Potato Inspectors. Dr. R.O. Lachance has translated the summary "New and Noteworthy Diseases" for the benefit of French readers.

We wish to thank all contributors to the Survey, including those not specifically mentioned above. Your submissions make these reports possible.

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New or Noteworthy Diseases

Stem rust (Puccinia graminis) was generally light on wheat throughout Canada in 1949. In Man., where stem rust was formerly so destructive, it was virtually absent from the varieties now commonly grown. The little rust that did develop was largely confined to barley. On the other hand, leaf rust (P. triticina) of wheat appeared early in Man. and spread rapidly to reach epidemic proportions with probably some reduction in yield throughout most of Man. and eastern Sask. Infection was also heavy in some localities in Eastern Canada. Races capable of attacking Renown and Regent are now present in the Prairie Provinces almost to the exclusion of other races. Although the new American variety, Lee (Hope x Timstein), has proven highly resistant in recent trials in the prairies, it may be noted that leaf rust collections made in southern Alta. and southeastern B.C. attacked the variety more or less heavily. Infection by stem rust and crown rust (P. coronata) of oats was generally light this year.

Dwarf bunt (race of Tilletia caries) was again found in B.C., mostly about Armstrong.

Eye spot (Cercosporella herpotrichoides Fron) was found affecting a sample of winter wheat from a field in Durham Co., Ont., which was severely diseased. Eye spot has not previously been reported in Canada, but it has come to be recognized as of considerable importance in England since its discovery there in 1935.

Common root rot (Helminthorporium sativum and Fusarium spp.) was more prevalent on wheat in Sask. in 1949 than in any previous year for which comparable data are available. It also appeared to be more prevalent than usual in Alta. and Man.

Seed sterility due to a fungus identified as Podosporiella verticillata O'Gara was found in trace amounts in 11 samples of common and durum wheat in an area from Assiniboia, Sask., to Edmonton, Alta. This rare fungus has not previously been recorded in Canada.

The finding of bacterial wilt (Corynebacterium insidiosum) well established in eastern Ont. suggests that the disease will eventually be recognized wherever alfalfa is grown in Canada. A modification of the method used in the identification of bacterial ring rot of potato has proved useful in determining the presence of C. insidiosum in root tissues of alfalfa.

A rarely recorded disease, bacterial stalk rot (Erwinia dissolvens), caused the death of 10% of the plants in one inbred corn planting in Essex Co., Ont. Stalk rot due to Gibberella Zeae caused heavy losses in yield in southern Ont. Although the perithecia of G. Zeae are found on overwintered corn stalks in Man., ascospore development and discharge appear to occur too late in the area to cause appreciable head blight of cereals. Corn smut (Ustilago Maydis) was exceptionally abundant in southwestern Ont.

Due to decreased flax acreage in Man. and Sask., flax is now grown in fields so widely scattered that there is little spread of disease from field to field although an individual field may be moderately affected. Seedling blight (Rhizoctonia Solani) of flax

appeared most severe on land in barley the previous year. For a second year Alternaria linicola, a common pathogen of flax seed in Western Canada, was isolated from brown stem lesions; symptoms of the disease were also readily reproduced this year in the field by spraying flax in the early boll stage with spores of A. linicola. Although infection was nowhere heavy, rust (Melampsora Lini) was present in scattered fields of Dakota in Man., whereas the variety was free of infection in 1948. Severe damage to Dakota may be expected in the future. That flax growing in Man. and Sask. is dependent on varieties resistant to wilt (Fusarium oxysporum f. Lini) was clearly demonstrated when 20 acres of Crown were sown to complete a field of Dakota; the Crown was almost completely killed by wilt whereas only traces developed in Dakota. Pasmo (Mycosphaerella Linorum) was found definitely affecting fibre flax at Guelph, Ont.

Pod and stem blight (Diaporthe Phaseolorum var. Sojae) became epidemic in some soybean varieties in Ont. Brown stem rot (Cephalosporium gregatum) was present in many fields of the variety Hawkeye. Manganese deficiency was general in soybeans and in some fields quality was impaired and yield reduced. Although the weather was unfavourable for the development of foliage diseases, sunflower rust (Puccinia Helianthi) was slightly more prevalent than last year in the rapidly expanding sunflower area in Man.

Bacterial ring rot (Corynebacterium sepedonicum) of potato proved unusually prevalent in Canada in 1949. This up-surge of ring rot may be accounted for by the hot, dry weather during a large part of the season. Experiments in 1937 indicated that such weather was unusually favourable to the development and symptom expression of the disease.

Late blight (Phytophthora infestans) of potato was of little importance in 1949. Over most of Canada the summer was hot and dry. Frequent rains and cooler weather favoured blight development in September, but losses from tuber rot were generally light except in P.E.I.

The low incidence of leaf roll (virus) in both seed-potato and table-stock fields is attributed to the extensive use of DDT in the principal potato-growing areas.

A new seedling blight (Fusarium oxysporum) of asparagus is described from the Niagara Peninsula, Ont. Mosaic (virus) affected a high percentage of the plants in 30 acres of beans in B.C. grown from imported seed. For the second year Arasan was used successfully to control wire stem (Rhizoctonia Solani) in cabbage in Quebec. Violet root rot (Rhizoctonia Crocorum) was found for the first time in Ont.; it appeared to be fairly prevalent on carrots in the Thedford Marsh in Lambton Co. Although whiptail of cauliflower is an uncommon disease in Canada, some evidence is presented that its occurrence here, as in New Zealand and Australia, is due to molybdenum deficiency. A new root rot (Pythium irregulare Buism.) of onions, known locally as yellow patch, has been observed in southwestern Ont. Yellow dwarf (virus) continues to be destructive to the onion seed industry in B.C. Observations made in Man. indicate that bacterial blight (Pseudomonas pisi) is one of the important seed-borne diseases affecting pea production in that province.

Fire blight (Erwinia amylovora) was more serious than for many years on pear and apple trees in the Okanagan Valley and the Kootenays, B.C. Apple scab (Venturia inaequalis) was heavy in the Salmon Arm district, B.C., but was very light in most other parts of Canada. Perennial canker (Neofabraea perennans) again increased in prevalence in the Okanagan Valley; this increase is due to the killing of woolly aphis parasites by the new insecticides. Since the introduction of a sprinkler system of irrigation in the Okanagan Valley, fruit rot (Phytophthora Cactorum) has attacked the fruit on the lower branches of pear trees.

Coryneum blight (Clasterosporium carpophilum) caused much less damage to the apricot crop in the Kootenays owing to the wide adoption of the recommended spray programme. Little cherry (virus) is still absent in the Okanagan Valley, but in the Kootenays only a few cherry orchards are unaffected. Cherry virus diseases continue to be serious in the Niagara Peninsula, Ont. Brown rot (Sclerotinia fructicola) caused no loss in the Okanagan Valley, B.C., in contrast with 1948, and it was of minor importance in the Niagara Peninsula, Ont.

Leaf blight (Dendrophoma obscurans) of strawberry became prevalent in Ont. late in the season. Considerable varietal differences were seen in the resistance to leaf scorch (Diplocarpon Earliana). Gnomonia Fragariae Kleb. var. fructicola Arn. and its pycnidial stage, Zythia Fragariae Laibach, were isolated from a leaf blotch at Ottawa, Ont. This is the first report of the fungus in Canada, but the blotch has probably been confused previously with other leaf diseases. Its importance as a pathogen is still in doubt. Red stele (Phytophthora Fragariae) was found for the first time in N.B. Yellows (virus) is severe and general in plantings of Marshall in coastal B.C. Root rot (cause unknown) caused heavy losses in several districts.

Stereum sanguinolentum appears from preliminary investigations to be the principal rot of balsam fir in N.B. Poria obliqua was found to be the cause of heart rot of Betula papyrifera var. commutata in B.C. Die-back (cause unknown) of birch is now ubiquitous in the Maritime Provinces. Cone rust (Chrysomyxa Pyrolae) was unusually heavy on Picea Engelmanni and P. glauca var. albertiana in B.C. Leaf rusts (C. ledicola and C. Empetri) were heavy on white and black spruce in northern Que. Shoot rust (C. Woronini Tranz.), hitherto unrecorded in the new world, was found on P. glauca in northern Que. and on the alternate host, Ledum palustre var. decumbens in Yukon.

Needle blight (Hypodermella concolor (Dearn.) Darker) was heavy on Pinus contorta var. latifolia in parts of B.C. Pole blight (cause unknown) of Pinus monticola is now known to be well established in southeastern B.C. Canker (Phomopsis lokoyae) caused considerable damage to Douglas fir at two places in B.C. Some further extension of the areas infected by Dutch elm disease (Cerastostomella Ulmi) took place in southern Que.

Rust (Puccinia Millefolii, formerly reported under the synonym P. Ptarmicae) was again heavy on Achillea Ptarmica in eastern Que. Downy mildew (Peronospora ?Antirrhini Schroet.), a new disease

for Canada, was found on cultivated snapdragons in Ont. Core rot (Sclerotinia Gladioli) caused losses of 65-95 per cent in several gladiolus varieties stored at Norwich, Ont., after inadequate curing. Severe injury to gladiolus corms from naphthalene fumigation occurred at Ottawa, Ont. Powdery mildew (Oidium sp.) caused heavy loss of hydrangeas in a greenhouse at Toronto, Ont., and stem rot (Sclerotinia sclerotiorum) destroyed most of a shipment from B.C. to Ont. Rust (Cumminsiella sanguinea) was found on Mahonia Aquifolium in eastern Que.; first report in eastern North America. Decline (virus) of narcissus is widespread in B.C.; although known for some time under various names, it has not been reported in the Survey.

Leaf and stem blight (Helminthosporium Portulacae Rader) was found in Ont. on Portulaca grandiflora and in Sask. and Que. on the weed, P. oleracea.

Maladies nouvelles ou d'Importance notable

Au Canada, il y eut généralement peu de rouille de la tige (Puccinia graminis) sur le blé, au cours de 1949. Au Manitoba, cette rouille, auparavant destructive, était pratiquement absente sur les variétés communément cultivées. Il n'y a que l'orge qui aît légèrement souffert de cette rouille. Par contre, la rouille des feuilles du blé (P. triticina) fit son apparition à bonne heure au Manitoba, et elle s'est disséminée rapidement pour atteindre des proportions épidémiques tant au Manitoba que dans l'est de la Saskatchewan; l'épidémie fut assez grave pour causer une diminution de rendement. L'infection fut également grave dans certaines localités de l'est du Canada. A l'heure actuelle, on ne peut guère trouver, dans les Prairies, que des races capables de s'attaquer au Régent et au Renown. La nouvelle variété américaine Lee (Hope x Timstein) s'est avérée très résistante au cours d'essais récents dans les Prairies; toutefois, certaines collections de rouilles provenant du sud de l'Alberta et du sud-est de la Colombie ont attaqué cette variété plus ou moins gravement. La rouille de la tige et la rouille des feuilles de l'avoine (Puccinia coronata) furent généralement peu graves cette année.

La carie naine (une race de Tilletia caries) fut observée cette année encore en Colombie Britannique, principalement aux environs d'Armstrong.

On a observé le Cercosporella herpotrichoides, cause de la pourriture des tiges, sur un échantillon de blé d'automne provenant d'un champ gravement atteint. Ce champ était situé dans le comté de Durham, Ontario. Cette maladie n'a pas été rapportée auparavant au Canada, mais depuis sa découverte, en Angleterre, en 1935, on s'est rendu compte que c'est une maladie importante.

La pourriture commune des racines du blé (Helminthosporium sativum et Fusarium spp.) fut plus grave en Saskatchewan en 1949 qu'en toute autre année pour laquelle nous possédons des chiffres comparables. De même, cette maladie fut apparemment plus grave que d'habitude en Alberta et au Manitoba.

La stérilité, causée par un champignon identifié comme Podosporiella verticillata O'Gara, fut observée à l'état de traces dans 11 échantillons de blé commun et durum prélevés dans la région allant d'Assiniboia, Saskatchewan, à Edmonton, Alberta. Ce champignon rare n'a pas encore été rapporté au Canada.

Le fait d'avoir trouvé que le flétrissement bactérien de la luzerne (Corynebacterium insidiosum) est bien établi dans l'est de l'Ontario suggère qu'éventuellement on rencontrera cette maladie partout où se cultive la luzerne au Canada. La méthode utilisée pour identifier le cerne bactérien des pommes de terre, une fois adaptée, s'est avérée utile pour déceler la présence de C. insidiosum dans les tissus des racines de luzerne.

La pourriture bactérienne des tiges (Erwinia dissolvens), qu'on a rarement rapportée, a fait périr 10% des plants d'un champ de maïs autofécondé, dans le comté d'Essex, Ontario. La pourriture des tiges causée par Gibberella Zeae a causé de lourdes pertes dans le sud de l'Ontario. Même si l'on trouve au printemps des périthèces de G. Zeae sur les chaumes de maïs, le développement et la libération des ascospores se produisent apparemment trop tard au Manitoba pour causer beaucoup de gale (brûlure fusarienne) des céréales. Le charbon du maïs (Ustilago Maydis) était particulièrement abondant cette année dans le sud-ouest de l'Ontario.

Comme conséquence de la diminution de l'étendue ensemencée en lin au Manitoba et en Saskatchewan, les champs étaient si dispersés qu'il y a eu peu de dissémination des maladies. La fonte des semis du lin (Rhizoctonia Solani) sembla particulièrement grave sur un retour d'orge. C'est la seconde fois qu'Alternaria linicola, pathogène assez commun de la graine de lin dans l'ouest canadien, est isolé de lésions brunes sur les tiges. En Saskatchewan, il fut assez facile, cette année, de reproduire dans le champ les symptômes de cette maladie, en arrosant le lin avec une suspension de spores d'A. linicola lorsque les caboches commençaient à se former. La rouille du lin (Melampsora Lini), sans être grave, était présente dans quelques champs de la variété Dakota; cette variété était exempte de rouille en 1948, et on peut s'attendre à ce qu'elle devienne susceptible un jour ou l'autre. Une observation a démontré préremptoirement que la culture du lin au Manitoba et en Saskatchewan est intimement liée à l'existence de variétés résistantes au flétrissement fusarien (Fusarium oxysporum f. Lini). Chez un fermier qui avait ensemencé 20 acres avec la variété Crown pour compléter son champ de Dakota, toute la partie ensemencée en Crown fut entièrement détruite, alors qu'on ne vit que des traces de flétrissement dans le Dakota. Le pasmo (Mycosphaerella Linorum) fut observé à Guelph, Ontario, dans le lin à filasse.

La brûlure des tiges et des gousses (Diaporthe Phaseolorum var. Sojae) prit une allure épidémique chez certaines variétés de soja en Ontario. La pourriture brune des tiges (Cephalosporium gregatum) du soja était présente dans plusieurs champs de la variété Hawkeye. La carence de manganèse était générale et, dans certains champs, la qualité et les rendements en ont souffert. En dépit d'une température défavorable au développement des maladies du feuillage, la rouille du tournesol (Puccinia Helianthi) fut un peu plus répandue que l'an dernier dans la région du Manitoba où cette culture connaît une expansion rapide.

Le cerne bactérien des pommes de terre (Corynebacterium sepedonicum) a accusé une recrudescence au Canada en 1949. On peut attribuer cet état de choses à la température chaude et sèche qui a prévalu durant la plus grande partie de la saison. Des expériences poursuivies en 1937 ont démontré que ces sortes de conditions climatiques sont particulièrement favorables au développement de cette maladie et à la manifestation de ses symptômes. Pour les mêmes raisons, le mildiou de la pomme de terre (Phytophthora infestans) n'a eu que peu d'importance en 1949. Toutefois, les pluies fréquentes et la température plus fraîche de septembre ont favorisé le développement de la brûlure, mais les pertes dues à la pourriture des tubercules furent plutôt légères, sauf dans l'Ile du Prince Edouard.

On attribue le faible pourcentage d'enroulement des feuilles (virus) des pommes de terre tant de semence que de consommation à l'usage généralisé du DDT dans les principaux centres de production.

Une nouvelle brûlure des plantules de l'asperge (Fusarium oxysporum) fut observée dans la péninsule de Niagara. En Colombie Britannique on a observé un très haut pourcentage de mosaïque dans un champ de haricots de 30 acres; la semence avait été importée. C'est la deuxième année qu'on utilise avec succès l'Arasan dans la lutte contre la tige noire du chou (Rhizoctonia Solani) dans Québec. On a observé pour la première fois en Ontario la pourriture rhizoctonienne des carottes (Rhizoctonia Crocorum). Cette maladie semble avoir été passablement répandue dans le Thedford Marsh, comté de Lambton. Le chou-fleur en fouet (whiptail) est une maladie peu commune au Canada, et, ici comme en Australie et en Nouvelle-Zélande, on a certaines indications à l'effet qu'elle serait due à une carence de molybdène. Une nouvelle pourriture des racines de l'oignon (Pythium irregulare Buism.), connue à certains endroits sous le nom de plage jaune, fut observée dans le sud-ouest de l'Ontario. La jaunisse naine (virus) continue d'exercer des ravages dans les plantations d'oignons pour la graine en Colombie Britannique. Des observations faites au Manitoba portent à croire que la brûlure bactérienne des pois (Pseudomonas pisi) est une des maladies importantes transmises par la semence dans cette province.

La brûlure bactérienne du pommier et du poirier (Erwinia amylovora) fut plus grave cette année qu'au cours de plusieurs années précédentes dans la vallée de l'Okanagan et dans les Kootenays en Colombie Britannique, mais elle fut très légère dans la plupart des autres régions fruitières du Canada. Le chancre gloéosporien (Neofabraea perennans) a accusé une nouvelle expansion dans la vallée de l'Okanagan; cette expansion est due à la destruction des parasites du puceron lanigère par les nouveaux insecticides. Depuis l'apparition des systèmes d'irrigation par aspersion dans la vallée de l'Okanagan, la pourriture des fruits (Phytophthora Cactorum) s'est développée sur les branches inférieures.

La brûlure (Clasterosporium carpophilum) a causé moins de ravages à la récolte d'abricots dans les Kootenays grâce à l'adoption générale du programme d'arrosages recommandé. La "petite cerise" (virus) n'a pas encore fait son apparition dans la vallée de l'Okanagan, mais, dans les Kootenays, rares sont les vergers qui en sont encore exempts. Les maladies

à virus du cerisier sont toujours une sérieuse menace dans la péninsule du Niagara, Ontario. La pourriture brune des pêches (Sclerotinia fructicola) n'a pas causé de pertes dans la vallée de l'Okanagan, contrairement à ce qui s'est produit en 1948; de plus, cette maladie a eu peu d'importance dans la péninsule du Niagara, Ontario.

La brûlure des feuilles (Dendrophoma obscurans) du fraisier s'est développée tard dans la saison en Ontario. Les variétés de fraisiers ont manifesté beaucoup de variation dans la résistance à la tache diplocarpéenne (Diplocarpon Earliana). On a isolé de feuilles malades, le Gnomonia Fragariae Kleb. var. fructicola Arn., et son stage pycnidien Zythia Fragariae Laibach, à Ottawa, Ontario. C'est la première mention de ce champignon pour le Canada, mais il est probable qu'avant cette année cette brûlure fut confondue avec d'autres maladies du feuillage; on ne connaît pas encore l'importance de cet organisme comme pathogène. Le "stèle rouge" (Phytophthora Fragariae) fut observé pour la première fois au Nouveau-Brunswick. La jaunisse du fraisier (virus) est générale et grave dans les champs de la variété Marshall sur la côte de la Colombie Britannique. La pourriture des racines (cause inconnue) a causé de lourdes pertes dans plusieurs districts.

D'après des résultats préliminaires, le Stereum sanguinolentum semble être la principale cause de la pourriture du sapin baumier au Nouveau Brunswick. On a déterminé que la pourriture du coeur de Betula papyrifera var. commutata est causée par Poria obliqua en Colombie Britannique. Le dépérissement (cause inconnue) du bouleau se trouve maintenant partout dans les provinces maritimes. La rouille des cônes (Chrysomyxa Pyrolae) était particulièrement grave sur Picea Engelmanni et P. glauca var albertiana en Colombie Britannique. Les rouilles des feuilles (C. ledicola et C. Empetri) furent graves sur l'épinette noire et l'épinette blanche dans le nord du Québec. La rouille de la tige (C. Woronini Tranz.), non rapportée à date dans le nouveau-monde, fut trouvée dans le nord du Québec sur P. glauca et sur l'hôte complémentaire Ledum palustre var. decumbens au Yukon.

La brûlure des aiguilles (Hypodermella concolor (Dearn.) Darker) fut grave sur Pinus contorta var. latifolia dans certaines parties de la Colombie Britannique. On sait maintenant que la brûlure du tronc (cause inconnue) de Pinus monticola est bien établie dans le sud-est de la Colombie. Le chancre (Phomopsis lokoyae) a causé des dommages considérables au sapin de Douglas à deux endroits en Colombie. L'aire d'infection de la maladie hollandaise de l'orme s'est quelque peu agrandie dans le sud du Québec.

La rouille (Puccinia Millefolii qu'on rapportait auparavant sous le synonyme de P. Ptarmicae) fut grave une fois de plus dans l'est du Québec. Le mildiou (Peronospora Antirrhini Schroet.), une maladie nouvelle au Canada, fut observée sur les mufliers cultivés en Ontario. Chez plusieurs variétés de glaïeuls entreposés à Norwick, Ontario, sans traitement préalable adéquat, la pourriture du coeur (Sclerotinia Gladioli) a causé des pertes s'élevant à 65-95%. A Ottawa, Ontario, on a observé de sérieux dommages résultant de la fumigation des bulbes de glaïeuls à la naphthalène. Le blanc (Oidium sp.) a causé des pertes

considérables aux hydrangers dans une serre à Toronto, Ontario, et la pourriture de la tige (Sclerotinia sclerotiorum) a détruit la majeure partie d'un lot expédié de Colombie Britannique en Ontario. La rouille (Cumminsielle sanguinea) du Mahonia Aquifolium fut observée dans l'est du Québec; c'est un premier rapport pour l'est de l'Amérique du Nord. Le déclin (virus) du narcisse est très répandu en Colombie; bien que cette maladie aît été connue depuis quelque temps sous divers noms, elle n'a pas été rapportée dans l'enquête. La brûlure des feuilles et des tiges (Helminthosporium Portulacae Rader) a été observée en Ontario sur Portulaca grandiflora, et en Saskatchewan et dans Québec sur P. oleracea, une mauvaise herbe.

The Weather and Its Influence on Plant Diseases

The weather on Vancouver Island during 1949 was featured by a very dry May, fairly dry September, and a warm and wet November. Due to low rainfall in May, some potato fields showed wilt, but showers in July greatly reduced its further spread. Late blight of potatoes did not appear until late in the season. The dry weather also checked various diseases of ornamentals, particularly those caused by Botrytis spp. Apple and pear scab were held under control except in areas of poor air drainage. Powdery mildew was possibly more prevalent in strawberries than usual, but since mites were prevalent, the symptoms were not always clear. Harvesting weather was satisfactory for flower and vegetable seed crops, and such diseases caused by Botrytis and Alternaria either did not appear or were held in check. The warm, wet November weather was undoubtedly favourable for the development of root rots caused by Phytophthora and Pythium spp. etc., and it is anticipated that these will show up in spring in strawberry and possibly raspberry crops (W. Jones).

On the lower mainland of B.C. the weather in 1949 was very favourable for growth and harvest. The fall was particularly fine and losses from storage rots such as late blight of potato were negligible (R.E. Fitzpatrick).

In the Cariboo district frosts on 8 and 9 Sept. blackened potato vines and caused vascular discoloration in the tubers throughout the area (N.S. Wright).

In the Kootenays the winter of 1948-49 was very severe, but a snow cover of 3 to 4 ft. averted serious injury. The spring and summer were moderately dry. Except for brown rot of stone fruits in the moister parts of the West Kootenay district, fungus diseases were not severe (M.F. Welsh).

The fall of 1948 and spring of 1949 were very dry throughout most of Alta. Winter injury of the various crops was not severe, but dry conditions resulted in light stands of both winter and spring grains. In southern Alta. substantial rains during late June, July, and early August produced good crops. These moist conditions during midsummer were probably responsible for the unusual development of bacterial blight on both wheat and barley in southern Alta. Common root rot of wheat was much more prevalent in southern Alta. than in other parts, where dry conditions prevailed throughout most of the season. Slight stem rust infection of

spring wheat was observed at Claresholm and Raymond, but it was somewhat more severe in a few fields of the later-maturing soft wheats. This disease was not recorded elsewhere in Alberta. In central Alta., rains during mid-July resulted in considerable second growth of spring grains, and many leaf diseases developed. A very heavy frost in early September stopped crop growth and prevented further spread of most diseases. In southern Alta. a heavy snowfall early in October provided cool, moist conditions favourable for the development of root rot in sugar beets (T.R. Davidson).

In Sask. the dry fall of 1948 aggravated winter injury of some perennial crops and gave poor conditions for seed germination, but a gradual spring thaw with little run-off improved the situation. Seeding of wheat was about three weeks in advance of 1948. May was warm, dry and with high winds, which quickly depleted soil moisture; consequently germination was uneven and some wheat seed moulded in the ground. The dry, early spring checked development of winter crown rot of alfalfa.

Heavy frosts in late May caused serious damage to wheat in western and to barley in northern areas. Rain in central areas and cool weather aided recovery from frost injury. The frosts struck when alfalfa was 4-6 in. high and black stem (Ascochyta imperfecta) was well started; but although subsequent weather was favourable to it little spread occurred in June. From late May onward rainfall was average or above average at Saskatoon, and temperatures normal except in August which was 5°F. above average. Evenly distributed rainfall in August offset the effect of the high temperature. Garden crops were good and potato yields well above average for the area.

In general, rainfall was high in the northeast part of the province, with wheat yields running over 19 bu./acre, but low in the southwest where the yield was only 5-8 bu. in the brown soil zone. Rains in early July in the northeast were followed by hot, dry weather that evidently checked cereal rusts; for these diseases, especially leaf rust of wheat, developed freely in moist areas. Large areas of wheat in the northeast suffered severely from common root rot and take-all. Leaf diseases of alfalfa and clovers developed late and caused little defoliation (T.C. Vanterpool, R.C. Russell).

In southern Ont. the hot, dry summer and mild, open fall had a marked influence on the incidence of diseases whose pathogens are particularly sensitive to humidity. Late blight of potatoes was of no importance until the fall when growing conditions for both host and pathogen became ideal. Lack of frost to kill the vines and the abnormally late growing season facilitated tuber infection. Late blight was practically non-existant on field tomatoes, which were harvested before the pathogen could spread to them from diseased potatoes. Apple scab was of little economic importance, being most prevalent in the extreme south-western region where the weather was not as dry as elsewhere. Primary infection occurred generally in Ontario between late bloom and the first cover spray, but subsequent dry weather prevented significant secondary infection. Cereal rusts and powdery mildews were generally light, but, owing to the mild, open fall, leaf rust and powdery mildew were more prevalent than usual on the newly-sown winter wheat (J.D. MacLachlan).

Rainfall in the Niagara Peninsula, Ont., was below the 20 year average in April, May, June and July. As a result the usually important fungous diseases, apple scab, brown rot of stone fruits, leaf spot of cherries, downy mildew of grapes, celery blight and tomato late blight were of no consequence.

Only three minor scab infection periods occurred, one on 26-27 April of about 12 hours duration and in which primary infection took place, and others on 19-20 May and 22-24 May, each of about 10-12 hours. Scattered infection of the young fruits resulted from these rainy spells. Dry, hot weather in June and July prevented development of mid or late season infections. The blossom blight phase of brown rot was negligible in spite of abundant apothecia and conidia on mummied fruits remaining on the trees. From the pre-bloom to after the petal fall period the weather was fair with low humidity and for several consecutive days the temperature rose to over 85°F.

On 23 April a heavy shower with hail knocked buds off peach and sweet cherry trees, bruised apple and pear buds still in the tight cluster stage and lacerated foliage of early lettuce, cabbage and spinach in localized areas.

Grape chlorosis was very prevalent. The trouble developed rapidly with the onset of dry weather in June and reached a peak in early July. Following rains and cooler weather in mid-July there was a general improvement although many vines remained paler than normal throughout the season. Warm weather following petal-fall of sour cherries delayed the appearance and reduced the amount of yellowing and leaf fall due to cherry yellows.

Drought conditions caused heavy losses in the staked tomato crop from blossom-end rot. Another physiological disease of importance and of widespread occurrence was heat spot of prunes. This trouble developed on several occasions after several days of high temperature (G.C. Chamberlain).

At Ottawa, Ont., January and February were exceptionally mild; rainfall was heavy and snowfall light, but snow cover was continuous and generally about 8-12 in. From March to May, temperatures were close to average; precipitation was normal in March and April but low in May. From then on the weather was unusually hot and fairly dry until late August, when heavy rains brought the precipitation above average for that month. Notable hot spells were 11-19 June, 29 June-4 July, 26-29 July, and 5-9, 22-23 and 26-27 Aug. September was cool and wet, but October was very warm and dry. November was cold with continuous snow cover from the 24th, but after mid-December rain and warm weather left the ground bare for a number of days. Foliage diseases were less important than usual under the dry conditions of the summer. The fair weather of October assisted the safe harvesting of late potatoes, following the threat of blight in September (D.B.O. Savile).

Plant diseases were not important in southwestern Que. during 1949, owing to weather conditions unfavourable for their development. Spring was dry with only few rains in May and June. July and August were exceptionally hot and dry, with the result that practically no disease developed on any crop. Powdery mildews, preferring dry conditions, were the only parasitic fungi observed in abundance, and they were growing on weeds and wild plants (L. Cinq-Mars).

The snow cover was light and of short duration in eastern Que. during the winter 1948-49; this condition did not favour development of perithecia of Venturia inaequalis. Moreover, the spring was particularly late and cool. Only during May and June could the perithecia mature and discharge ascospores.

Cool weather throughout June was favourable for the pycnial and aecial stages of many rusts and for such diseases as Botrytis blight and leaf curl (Taphrina sp.).

July and, especially, August were hot and dry, but most rusts and powdery mildews were able to persist. September was wet and cool, but, after a severe drought, no serious epidemic developed on the few unharvested crops. October was exceptionally mild and permitted new growth of vegetation and, as well, the development of many fungi, pathogenic and otherwise. The aecial stage of Uromyces Trifolii was found together with the telial stage. November brought severe weather (A. Payette).

There were no extremes of temperature or prolonged cold spells in N.B. during the winter of 1948-49. The fields were bare the first 3 weeks of January but successive snow-falls at first light and later progressively heavier increased the snow cover until it reached 24 in. on 23 March. During the last week of the month rising temperatures and a rainfall of 0.6 in. melted most of the snow and the ground became bare. The ice broke in the Saint John River on 5 April, and considerable rain fell on 14 days of the month. At the beginning of May the soil was firm and frost-free. Light rains during the first week delayed seeding, which became general by 9 May. Weather conditions were most favourable for farm work from 10 to 22 May. During the last week in the month almost 2.5 inches of rain fell.

The relatively warm weather in March and April stimulated growth of grasses and clover. However, clover stands, especially red clover, were thin. Dry weather in mid May, cool weather in late May, and dry weather in the first three weeks in June, all further retarded clover, which contributed little to the hay crop or pasturage. Apple orchards wintered fairly well and there was little or no injury to strawberries, raspberries, perennial flowers and shrubbery. Full bloom in apple orchards was earlier than average, from 23 to 27 May. Apple scab ascospore discharge was first recorded on 25 May and scab made its appearance on the foliage on 11 June.

Scattered showers made up much of the summer rainfall. The precipitation for June, July and August was considerably below the 36-year average, but the rainfall was timely. Grain ripened rapidly in late July and early August. The straw was short, very free from rust, with little lodging. Yields were considerably above average, but the grain was light in weight per bushel.

Harvest conditions were good during July, August and the first 13 days of September, but rain fell on 14 of the last 17 days of September. Fortunately, little rain fell in October, and root crops were harvested under ideal conditions. The yields of most garden and root crops were exceptionally good. Potato yields were decidedly above average and there was little blight in the tuber crop. The apple crop was heavy and fairly clean with good colour but slightly under-sized fruit. An early frost on the night of 11 Sept. killed the tops of potatoes, tomatoes, cucumbers, and other garden crops. No freezing temperatures occurred again during the month.

Ten inches of snow fell in November, but rain left but three inches of snow on the ground by the end of the month. The first three weeks of December were cold, with -10°F. on 11 Dec. A snowfall of 18½ in. occurred on 5 Dec., but by 21 Dec. 80% of the fields were bare (J.L. Howatt).

In N.S. an early spring with normal to sub-normal precipitation and slightly above normal temperature was unfavourable to fungus disease development. Apple scab was less serious than usual, as were brown rot of stone fruits, cereal rusts and the Botrytis diseases of many plants. A general outbreak of red stele of strawberry in 1948 was followed in 1949 by the finding of only a few specimens. Late blight of potatoes appeared in July in coastal districts, but was markedly scarce until late September in inland plantings.

The dry summer induced severe blossom-end rot of tomatoes which was followed by severe fruit cracking as the result of a heavy rain. Bitter pit of apples also appeared late this year and was severe in susceptible varieties. An appreciable amount of storage pit developed in Cox Orange after a month's storage.

The season as a whole was more favourable to physiological disorders than to the fungus diseases usually observed (J.F. Hockey).

Very mild weather in P.E.I. during January, February, and March permitted rail shipment of potatoes without the usual frost hazard. The winter being mild and without serious sub-cooled rains, orchards escaped injury to the young shoots; no die-back of apples, pears, and plums occurred and the trees came through in a thrifty condition. Apple scab spore discharge was delayed until late May due to light rainfall. It subsequently became active in neglected orchards, infection becoming very heavy during the rainy month of September.

The main growing season having been warm, and free from droughts and early frosts, crop returns have been exceptionally good. Freedom from excessive rainfall held turnip club root to a minimum, although this crop suffered considerably from boron deficiency due to low soil moisture reducing its availability. Potato scab increased on soils of low water-holding capacity.

Trace infections of late blight were found on plants of Irish Cobbler in mid-July. During early August it became severe in unsprayed fields of this variety in localities on the south shore where fogs had occurred. Later varieties showed no infection until September, when daily rain 6-10 Sept. allowed the disease to become established. With rain on 13 of the last 15 days of the month the disease developed rapidly and reached epidemic proportions, but came too late to reduce yields significantly. During this wet period spraying and vine killing could not be done efficiently. Growers who killed the vines before the advent of the rainy period harvested healthy crops, unless digging was undertaken before the plants were completely dead; but where vine-killing was post-poned until the end of September the rain washed spores into the soil and tuber rot resulted.

Notes on Plant Parasitic Nematodes in Canada

A.D. Baker,
Division of Entomology, Ottawa.

During the past year the general situation in regard to some of our more important nematode pests has received attention; the following brief notes make reference to these and also a few additional species that have only recently been located in this country.

The sugar-beet nematode, Heterodera schachtii (Schmidt, 1871), should continue to be classified in this country as an important plant pest. However, we have no record that would indicate any sign of spread from the area in the Sarnia (Blackwell) region covered by previous reports. Although injury from this source has decreased at least slightly, this decrease is undoubtedly due to more attention being paid to suitable crop rotations that permit the growing of sugar beets from time to time without marked injury. At the same time the nematode populations in the area are such that any change or any relaxation of the crop-rotation practice would rapidly lead to increased crop loss.

The oat nematode, Heterodera avenae Lind, Rostrup & Ravn, 1913, is another important plant pest and while recent surveys have not been made it is very likely that some spread of this pest is occurring. In the past this parasite has been responsible for considerable crop loss, particularly in oats and barley, but as the cause of this injury has become better known, crop rotations have tended to decrease the hazard.

What was previously known as the root knot nematode, Heterodera marioni, is now being separated into a number of distinct species, for which Chitwood (1949) has resurrected the genus Meloidogyne. There is now great need of information that will indicate more clearly what species of this group are actually present in Canada and what host plants are attacked by each species.

The potato rot nematode, Ditylenchus destructor, has shown no further sign of spread in Prince Edward Island, although some infestations are being progressively revealed in land previously affected. From the standpoint of crop loss, this parasite has not shown itself of major importance, and repeated cropping with potatoes tends to decrease rather than increase field infestations.

The presence of Ditylenchus radicicola (Greeff, 1872) Filipjev 1936, has previously been reported in Canada by Prof. T.C. Vanterpool; and more recently a leaf gall nematode, which has been tentatively identified as Ditylenchus graminophilus (Goodey, 1933) Filipjev, 1936, has been identified from Calamagrostis canadensis from a number of regions in Quebec. Information is being accummulated at the present time on the distribution of the latter species.

Of other pests already recorded from Canada, a number of identifications have been made, but the data, except for indicating the continued presence of these forms, have not revealed any new information on distribution. These forms include such pests as Pratylenchus pratensis, Anguina agrostis, Aphelenchoides fragariae, Aphelenchoides parientinus, Ditylenchus dipsaci and Aphelenchus avenae.

Plant Diseases in Newfoundland

J.F. Hockey

The following observations were made during a four-week field trip beginning in late July, 1949. No attempt has been made to summarize other reports and references to plant diseases in Newfoundland. The following remarks are confined to such diseases as were observed during the short period of the summer survey. They will be reported by crops.

POTATO

Potato Wart - Potato wart or canker is common in gardens and small plots in many parts of the Avalon Peninsula and in areas along the East Coast. It is not present in the West Coast districts as far as could be ascertained. Farmers in the West Coast districts stated they had not seen it nor heard of its occurrence there.

Potato wart has been present for over twenty years. (See note below).

Note: Potato wart has in reality been present in Newfoundland for over 40 years as it was found there in 1909. According to Dr. Güssow, former Dominion Botanist, the editor of a Montreal farm paper sent him for examination specimens of tubers affected by wart, which the editor had received from a farmer on Red Island in Placentia Bay, Newfoundland (Evidence of Mr. H.T. Güssow before the Select Standing Committee on Agriculture & Colonization 1909-10. Ottawa 1910, p. 74). The discovery was published promptly and Canadian farmers were warned against the danger, along with a graphic description of the disease. (Güssow, H.T. A serious potato disease occurring in Newfoundland: Dept. Agr. Central Exp. Farm Bull. 63. October 1909). Dr. Güssow "was sent by the Department of Agriculture to investigate the origin of the disease and advise the Newfoundland government in dealing with it". When in December 1909 he visited the general locality, from which the first samples came, he found that the disease was "far more prevalent than was supposed". From enquiries made on the spot he concluded that "the disease was known to some growers for several years" (Evidence p. 64) and that it probably had been"introduced by means of diseased tubers from Scotland".

Early in the 1930's the Newfoundland Government imported potato seed of apparently resistant varieties and distributed it to farmers and part-time farmers. This seed held up for many years, but during the 1940's the imported varieties broke down with canker. Some small lots of Arran Victory and Arran Pilot were imported and distributed in the spring of 1949. Plots of these latest imports were seen in the Conception Bay area. Plants of Arran Victory were 100 per cent affected in one plot. Adjacent plants of Arran Pilot showed some infection, whereas, a third plot of the variety Sebago showed no infection at the time of inspection.

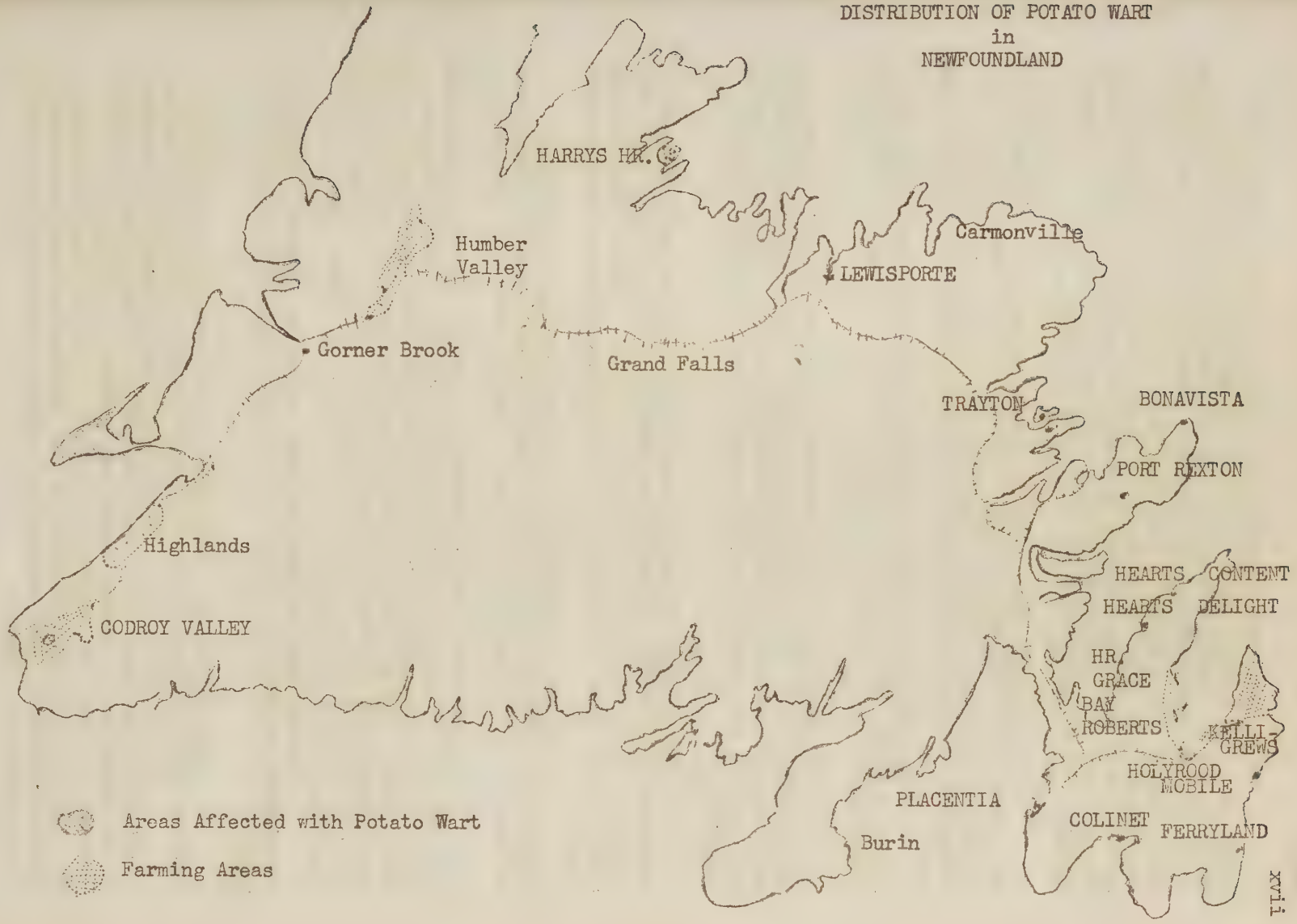
The following are the main potato varieties that have been tested in the Conception Bay area during the past several years and have been found susceptible to potato wart: Arran Victory, Arran Banner, Arran Pilot, Kerr's Pink, Great Scot, Bliss Triumph, Irish Cobbler, Green Mountain, Spaulding Rose, Early Rose, Dakota Red, Gold Coin, and Island Blues or Cow Horn Potato.

The part-time farmer with his small plot of ground finds potato canker his chief trouble. He has insufficient arable land for a rotation of crops. On the other hand the farmer with 10 to 50 acres under cultivation has little or no loss from potato canker. He rotates his crops between potatoes, cabbage or turnips and hay and occasionally plows down as green manure an oat-pea-vetch mixture or other annual crop. When cabbage is planted the farmer usually follows the recommended corrosive sublimate treatment for the control of maggot. This treatment may have an effect on the incidence of canker in some fields.

Later in 1949 a more detailed report on potato wart in Newfoundland was prepared by G.C. Morgan, representative of the Division of Plant Protection at St. John's. Of special interest is his map of Newfoundland, here reproduced, showing the areas where wart is known to occur.

Among the potato varieties listed by Hockey as susceptible in tests in the Conception Bay area, Arran Victory, Arran Banner, Arran Pilot, Great Scot, and Kerr's Pink are considered immune in Scotland (The maintenance of pure and vigorous stocks of varieties of potatoes. Dept. Agr. for Scotland Misc. Publ. No. 3, revised edition 1944). Under conditions in Pennsylvania the American varieties Irish Cobbler, Green Mountain, Spaulding Rose, Dakota Red, and Gold Coin and the British varieties Arran Victory, Great Scot and Kerr's Pink were immune, whereas Bliss Triumph and Early Rose were susceptible to wart (F. Weiss et al. U.S.D.A. Dept. Bull. 1156. 1923). More recent trials in Pennsylvania (R.E. Hartmen and R.V. Akeley. Am. Potato Jour. 21(10): 283-288. 1944) indicate that Sebago is susceptible.

It seems quite probable that the susceptibility of varieties immune to wart in Great Britain and Pennsylvania under conditions in Newfoundland is the result of biologic specialization. Such specialization in Synchytrium endobioticum was discovered almost simultaneously by C. Blattny (cf. R.A.M. 25:468-9. 1946) working in Czechoslovakia and H. Braun (cf. R.A.M. 22:273. 1943) in Germany. Braun recognized three biotypes, and found two potato varieties immune to all three biotypes.--I.L. Conners.


DISTRIBUTION OF POTATO WART
in
NEWFOUNDLAND
HARRYS HR.
Humber
Valley
Carmonville
LEWISPORTE
Gorner Brook
Grand Falls
TRAYTON
BONAVISTA
PORT REXTON
Highlands
HEARTS CONTENT
HEARTS DELIGHT
CODROY VALLEY
HR
GRACE
BAY
ROBERTS
KELLI-
GREWS
HOLYROOD
MOBILE
PLACENTIA
COLINET
FERRYLAND
Burin
Areas Affected with Potato Wart
Farming Areas

The potato canker problem is linked up with the subsistent farmer who owns a small plot of ground comparable to a garden plot. On this area he usually chooses to grow his own requirements of potatoes and possibly a few sacks extra for sale. There is a very strong opinion among many of these men that they must plant potatoes each year. Accordingly they continue to plant potatoes and in very many cases harvest crops of tubers affected with wart to varying degrees. Some of the potatoes from these small plots or gardens find their way to local markets. It would be difficult to control that trade.

Late Blight - Late blight was not positively identified during the period of the survey. Farmers in the East Coast areas claim frequent late season epidemics occurring in late August or early September. Killing frosts appear to prevent excessive losses from tuber rot.

The West Coast farmers appear to have less frequent and less severe epidemics of blight. No late blight has been seen on many farms for three or four years in succession.

Early Blight - Light scattered infections of early blight were seen on only a few farms. One severe outbreak affecting all the plants was observed in an acre field of Parsons Beauty near Jeffries. On an adjacent 1/3 acre patch of Irish Cobbler a trace of early blight was recorded.

Rhizoctonia - Plant and crown symptoms of rhizoctonia were occasionally observed. A few fields showed less than one per cent when examined. A one acre plot showed eight per cent. Farmers reported they have seen the scurf on tubers, but it was seldom severe enough to cause loss.

It should be understood that there have been no grading regulations enforced on local potato markets, hence growers' reports of no loss from rhizoctonia or scab may be open to some modification.

Scab - Common scab of potatoes is found, but little commercial loss from the disease is reported by most farmers. A few fields were seen during early harvest, but in only one field were the tubers showing scab lesions. The problem of common scab is associated with new soil and areas where brush was burned in preparing the land for breaking. In the majority of older fields under crop rotation, the farmers report only minor losses from common scab.

Powdery scab has been reported as present in Newfoundland but the disease was not seen, even on tubers in storage from the late 1948 crop.

Black Leg - Most potato fields were free from black leg, but some were observed with as much as six per cent of the plants affected.

Most of the farmers who had black leg explained its presence to either (1) new seed or (2) omission of the customary seed treatment. It was interesting to observe that many farmers use annually a corrosive sublimate or Semesan Bel treatment for their seed potatoes. The corrosive sublimate treatment is the commoner as most farmers in Newfoundland treat their main crop of cabbage plants with this chemical for the control of maggot.

Botrytis Leaf Blight - The older, yellowing leaves of plants in several fields were found with Botrytis fruiting abundantly on discoloured areas.

Virus Diseases - Mosaic was seen much more frequently than leaf roll during the survey. Mild mosaic was encountered in a few fields, infection running between thirty and ninety per cent of the plants. The majority of fields and plots examined had less than twenty per cent mosaic.

Leaf roll was not observed affecting over two per cent of the plants.

The predominance of the varieties Arran Victory, Arran Banner and Kerr's Pink, with which the writer is not very familiar, may have reduced reliability of virus disease identification in these varieties. On the other hand, much of this stock was imported from England as certified seed and the small aphid population and cool climate would tend to keep virus disease increase at a minimum.

The variety Northern Beauty was the most severely virus-infected variety seen (90%). The farmers who plant several acres of potatoes annually, obtain Certified or Foundation Seed from P.E.I. every year or every two or three years.

The field men of the Department of Natural Resources encourage farmers to get certified seed as soon as they see much evidence of virus disease. However, the local demand for certified seed of the blue potatoes is greater than the available imported supply.

CABBAGE AND TURNIPS

Club Root - Club Root is the most prevalent and serious disease of cabbage and turnip in Newfoundland. Root maggot is undoubtedly the most prevalent pest of these crops but next to root maggot it would appear that club root takes the second largest toll. Plant losses in main crop cabbage plantings were up to thirty per cent in a few fields. Little loss from club root was seen in early cabbage fields.

Turnips were not observed severely affected with club root as an appreciable number of farmers use Wilhelmsberger swede as soon as they find their fields showing club root.

There is a definite need for an improved method for the control of club root of cabbage, as the common rotation of potatoes, crucifers, and hay does not permit of heavy applications of lime that would discourage club root but encourage potato scab. However, some growers are using lime but trying to keep their soil below pH 5.5.

Other Diseases - Downy mildew was observed as a minor disease in both turnips and cabbage.

Wire stem (probably Rhizoctonia) caused a loss of sixty per cent of the cabbage plants in a late-crop seeding.

OTHER CROPS

Beets - A number of small plantings of beets, none exceeding half an acre were examined. Leaf spot (Cercospora beticola) was found, but in every field infection was slight. Farmers claim that they occasionally find some severely scabbed roots at harvest, but the loss is apparently so slight that it occasions no concern.

Carrots - The fall dandelion, Leontodon autumnale, is very prevalent in Newfoundland and is frequently found affected with aster yellows virus. Mr. H.A. Butler reported that the insect vector, Macrosteles divisus, is present in the province. No disease was found in most carrot plantings examined, but a few plants showing early symptoms of yellows were seen in two plantings. Some farmers were familiar with the "bunchy top" or "fuzzy root" condition as seen at harvest, but they stated loss from this cause was insignificant.

Oats - Loose smut was observed in two fields, although many were examined. No rust was seen during the survey. Leaf blotch was present to a slight extent in many fields. Blast was slight, if present, with seldom more than two or three florets affected in a head.

Strawberry - Leaf spot (Mycocphaerella Fragariae) and blotch (Diplocarpon Earliana) were quite prevalent in the Pasadena area. Leaf spot was commonly observed in many districts on both wild and cultivated plants.

Raspberry - Mosaic was commonly observed on wild plants throughout the island. Occasional plants affected with leaf curl were also seen. Canes showing a trace of anthracnose and some with cane blight were observed at Sandringham.

Apple - Scab was causing defoliation of unsprayed trees of McIntosh at Pasadena and Cartyville. Moderate infection of the leaves and fruit of Early McIntosh was evident. The varieties Yellow Transparent, Duchess, and Wealthy carried only very slight infections.

Stone Fruits - Plums and cherries are frequently found affected with black knot. The wild pin cherry is seriously affected in some districts.

Alsike Clover - Plants affected by rust (Uromyces Trifolii) were collected at McKays; this field was severely defoliated. Leaf blotch (Cymadothea Trifolii) was observed in several fields.

Grasses - Powdery mildew was observed in several fields but no rusts were found.

Balsam Fir - Witches' broom (Melampsorella Caryophyllacearum) is common, frequently causing brooms of three to five feet in diameter. A Peridermium on the needles was also frequently seen.

Willow - Scab (Fucicladium saliciperdum) was found on a few trees near Whitbourne.

Phenological Data - 1949

The records were taken this year by B. Peturson at Winnipeg, R.C. Russell at Saskatoon, and S.G. Fushtey at Edmonton. They show that the season was from five to ten days early at Winnipeg up to the middle of June. At Saskatoon flowers bloomed at or close to their average dates throughout the season. At Edmonton, the season was somewhat early up to the end of May, lagged slightly in June, and finished about normal. The wheat, of which records were kept, was sown at widely different dates at all three places, so that comparisons relating to it are rather difficult to make. At Winnipeg the wheat was sown nine days earlier than usual and was harvested twelve days earlier than usual. At Saskatoon wet, cool weather held up the harvest, so that the wheat was harvested 16 days late although it developed throughout most of the growing season only five or six days behind the normal. At Edmonton wheat sown 13 days late gained several days and was harvested one week later than usual (R.C. Russell).

Anthesis dates at Ottawa, with number of days departure from average, for 8 plants from the main list were as follows:

Populus tremuloides	13/4	3E	Anemone canadensis	2/6	2E
Acer Negundo	1/5	2L	Bromus inermis	15/6	5E
Prunus pennsylvanica	9/5	5E	Phleum pratense	20/6	5E
Smilacina stellata	15/5	4E	Solidago canadensis	3/8	3L

Anthesis dates for marker plants at Ottawa, with the number of days departure from average, were as follows:

Acer saccharinum	6/4	5E	Carya cordiformis	10/6	3E
Ulmus americana	22/4	4E	Tilia americana	3/7	4E
Acer saccharum	4/5	4E	Polygonum cuspidatum	3/9	1L
Pinus sylvestris	25/5	4E	Hamamelis virginiana	19/9	9E

At Ottawa the spring season opened, with the flowering of Acer saccharinum, five days ahead of average. Throughout spring and summer the season continued from three to four days earlier than average (W.H. Minshall).

SUMMARY OF PHENOLOGICAL DATA TAKEN AT WINNIPEG, SASKATOON, and EDMONTON, IN 1949

	Winnipeg		Saskatoon		Edmonton	
Pulsatilla Ludoviciana	--	--	17/4	N	--	--
Populus tremuloides	20/4	5 E	24/4	1 L	19/4	5 E
Phlox Hoodii	--	--	29/4	4 L	--	--
Salix petiolaris	--	--	4/5	2 L	--	--
Acer Negundo	29/4	8 E	7/5	1 L	25/4	7 E
Betula papyrifera	--	--	10/5	1 L	28/4	10 E
Thermopsis rhombifolia	--	--	10/5	N	--	--
Prunus americana	4/5	9 E	--	--	--	--
Amelanchier alnifolia	7/5	9 E	14/5	1 L	10/5	5 E
Hierochloë odorata	--	--	17/5	N	--	--
Prunus pennsylvanica	--	--	20/5	1 L	12/5	5 E
Viola rugulosa	--	--	22/5	1 L	16/5	4 E
Smilacina stellata	16/5	7 E	24/5	1 L	26/5	N
Prunus sp. (Chokecherry)	17/5	10 E	28/5	1 L	21/5	5 E
Crataegus sp. (Hawthorn)	16/5	10 E	28/5	1 L	--	--
Viburnum Lentago	29/5	6 E	--	--	--	--
Cornus sp. (Dogwood)	20/5	7 E	30/5	1 L	28/5	3 E
Elaeagnus commutata	--	--	4/6	1 L	30/5	5 E
Lonicera glaucescens	--	--	8/6	1 L	31/5	8 E
Viburnum trilobum	--	--	--	--	--	--
Viburnum pubescens	3/6	6 E	--	--	--	--
Anemone canadensis	2/6	5 E	10/6	1 L	25/6	1 E
Achillea lanulosa	--	--	10/6	1 L	29/6	3 L
Diholcos bisulcatus	--	--	11/6	1 L	--	--
Galium boreale	--	--	13/6	1 L	20/6	?
Rosa alcea	--	--	17/6	1 E	--	--
Gaillardia aristata	--	--	23/6	1 L	--	--
Campanula petiolata	--	--	23/6	N	--	--
Bromus inermis	13/6	8 E	24/6	N	29/6	2 L
Chrysopsis hirsutissima	--	--	29/6	N	--	--
Spiraea alba	--	--	2/7	1 L	--	--
Symphoricarpos occidentalis	--	--	4/7	1 L	6/7	2 L
Psoralidium argophyllum	--	--	10/7	N	--	--
Phleum pratense	--	--	--	--	8/7	1 L
Lactuca pulchella	--	--	9/7	N	11/7	2 E
Chamaenerion spicatum	--	--	--	--	11/7	1 L
Agastache anethiodora	--	--	--	--	8/7	3 E
Cirsium Flodmanii	--	--	15/7	N	--	--
Solidago missouriensis	--	--	15/7	1 L	--	--
Solidago canadensis	--	--	--	--	19/7	1 L
Grindelia perennis	--	--	23/7	1 E	--	--
Oligoneuron canescens	--	--	25/7	N	--	--
Aster ericoides	--	--	28/7	N	--	--
Aster laevis	--	--	30/7	N	30/7	1 E
Wheat ..... sown	16/4	9 E	30/4	5 L	12/5	13 L
..... emerged			16/5	6 L	20/5	10 L
..... headed	17/6	11 E	6/7	6 L	5/7	3 L
..... harvested	24/7	12 E	22/8	16 L	22/8	7 L

I. DISEASES OF CEREAL CROPS

WHEAT

BLACK MOULD (Cladosporium herbarum and Alternaria tenuis) developed frequently, in late August and September, on standing grain in Sask., where the plants were killed early by common root rot or take all. Not only the heads and culms were attacked, but also broad areas of the leaves in many fields in N.E. Sask. (T.C. Vanterpool).

EYE SPOT (Cercosporella herpotrichoides Fron). A sample of wheat plants supposedly affected by take all from a field of winter wheat in Durham Co., Ont., was received from E.A. Summers, District Representative. It was estimated that 40% of the straws were down and the yield not over 10-15 bu. per acre. Examination revealed no take all or common root rot. The saprophyte, Wojnowicia graminis, not previously reported in Ont., was fruiting on one plant. These findings were afterwards confirmed by P.M. Simmonds. The affected straws did show rather regularly a discoloured and collapsed area in the first internode. The disease was diagnosed as eye spot by Mrs. G. Dion, N.R.C. Regional Laboratory, Saskatoon, formerly with Dr. Mary Glynne, Rothamsted. The fungus was induced to fruit on the affected parts and was subsequently isolated. Eye spot has been considered a disease of considerable importance in England since it was first recognized there in 1935. The present report is the first of its occurrence in Canada (I.L. Conners).

ERGOT (Claviceps purpurea). A trace of ergot was found in a field in east Sask. and in Thatcher seed from south central Sask. (H.W.M.).

ANTHRACNOSE (Colletotrichum graminicola). Infection was light to moderate in 12 fields in S.E. Sask. (H.W.M.).

POWDERY MILDEW (Erysiphe graminis) infection was 3-tr. 3-sl. 1-mod./ 37 fields of winter wheat and 40-tr. 24-sl. 18-mod. 7-sev./ 399 of spring wheat in Alta. Infection was much more severe in southern Alta. than in the central and northern regions (T.R.D.). The disease was particularly severe in the Claresholm area, where the spikes as well as the leaves were attacked (M.J. Grant). Powdery mildew was very light on the 1949 crop of winter wheat in Ont. although infection was mod.-sev. in some O.A.C. plots at Guelph in June. The disease was very prevalent on the newly sown 1950 crop. Samples received from E.A. Summers from Durham Co. were mod.-sev. affected and showed considerable yellowing. He reported that a field of Dawson's Golden Chaff was quite yellow, but that a field of Cornell 595 was unaffected. He found the disease worst in the early-sown fields (J.D. MacLachlan). On the Central Experimental Farm, Ottawa, infection was tr.-sev. (av. mod.) in 5 out of 9 fields examined (V.R. Wallen).

HEAD BLIGHT (Fusarium spp. and Helminthosporium sativum). In 1949, 11 collections of head blight were obtained from B.C., Man., Ont., and Que. Infection was rated a trace. The identity of the organisms present in each collection was determined by the usual cultural methods. The organisms

isolated from each variety and place were: B.C.-Agassiz, Little Club, Fusarium culmorum; Man.-Morden, McMurachy, H. sativum; Ont.-Ottawa, Redman, H. sativum (chiefly) and F. Equiseti;St. Catharines, Thatcher and Redman, F. Equiseti and F. Poae; Williamstown, Hope x Timstein, F. Poae; Que.-Lennoxville, McMurachy, F. Poae; and Normandin, Little Club, McMurachy, and Hope x Timstein, F. avenaceum, Norka, F. graminearum, and Verval, F. graminearum and F. avenaceum (W.L. Gordon).

COMMON ROOT ROT (Helminthosporium sativum and Fusarium spp.). Infection was 121-tr. 140-sl. 53-mod. 4-sev./399 fields of spring wheat and 6-tr. 9-sl. 9-mod. 4 sev./37 of winter wheat in Alta. The disease appeared to be most severe in southern Alta. Infection was tr.-sl. in the variety plots at Lacombe and Olds (T.R.D.). In southern Alta. infection was 11-tr. 5-sl. 1-mod./29 fields of winter wheat seeded in the fall of 1949 (M.N. Grant).

Common root rot appears to have been more prevalent in Sask. in 1949 than in any previous year for which comparable data are available. The mean disease rating for the 245 fields inspected was 13.39 with a standard deviation 5.58. In all nine crop districts the ratings were higher than in 1948 and in the four districts across southern Sask. the figures were up 50-100%. There has been a marked upward trend from the low mean rating of 6.0 in 1942 to the high of this year. The ratings for the crop districts 1 to 9 in 1949 were respectively 12.5, 14.1, 17.5, 19.7, 9.8, 15.9, 13.4, 11.4, and 10.5. As in previous years these ratings show a high negative correlation with the average yield per acre in the various crop districts. The first estimates of the Sask. Secretary of Statistics for crop districts 1 to 9 were 18.1, 10.6, 3.5, 2.9, 22.0, 10.3, 10.3, 26.1, and 18.6 bu. per acre. In some individual fields in the northern areas, particularly about Nipawin, 30-40% of the surface area of the field was affected by the prematurity blight phase of common root rot. Plants from such areas yielded severely shrunken grain (B.J. Sallans).

A survey trip through northern Sask. on 9-10 Aug. revealed that wheat, as well as the odd field of barley present, was suffering from the worst outbreak of root rot ever recorded for this part of the province. Take all, as expected, was worst where two or more consecutive crops of wheat had been grown; in 2 such fields the stunted areas involved 20-25% of the field. Moreover, several fields on new breaking showed a slight, fairly uniform distribution of take all and a moderate amount of root rot of the prematurity type, in which the heads are empty but the stem-bases are only slightly discoloured. Many fields on older land were heavily attacked by common root rot, all plants in large areas being affected. Although little or no external discolouration was evident, the crowns of affected plants were found to be darkened internally when cut open. On incubating, these samples yielded mostly Helminthosporium sativum and occasionally Fusarium spp. In specimens collected on a later trip on 31 Aug.-1 Sept. from many of the same fields the relative frequency of H. sativum and Fusarium spp. was reversed. This result suggests that H. sativum was the primary pathogen. Although moisture was ample, symptoms of root rot appeared during the hot spell, 1-9 Aug., when the maximum daily temperature was 72°-88°F. Except for a severe frost of 12°-16°F. on 24 May,

which killed the early top-growth and caused abnormal tillering of the plants, the season was favourable for plant growth, and with the return of cool, moist weather yields were well above average in spite of damage caused by root rot. While it is true that high soil moisture favours the development of take all, it is generally agreed that on the more open prairie common root rot decreases with increase of soil moisture (P.D.S. 28:2). This outbreak, however, occurred when moisture was above normal. The need for a close study of the ecology of common root rot on the transitional soils of the northern park belt is apparent (T.C. Vanterpool).

The prematurity blight stage of common root rot was general in Man. and caused 2% estimated damage. It was severe in patches in S.W. Man. (J.E. Machacek).

TAKE ALL (Ophiobolus graminis). Infection was 32-tr. 10-sl. 3 mod./399 fields of spring wheat and 2-tr. 4-sl. 1-mod./37 of winter wheat examined in Alta. (T.R.D.). Several fields in the Cowley area were ploughed up in the late spring as a result of severe winter killing and root rot (M.N. Grant).

Several second and third crops of wheat on new land in the Snowden area, west of White Fox, Sask., suffered severely from take all. Elsewhere only trace infections were found (H.W.M.). Infection was slight to severe in the northern park belt of Sask., the disease being severe at Snowden and Smeaton (T.C. Vanterpool). Take all was generally light and occurred sporadically in Ont. (J.D. MacLachlan).

SEED STERILITY (Podosporiella verticillata O'Gara). According to H.A.H. Wallace (Phytopathology 40:30. 1950), this fungus was isolated from 11 samples of seed of common and durum wheat grown in 1946 and 1947 and originating in an area from Assiniboia, Sask., to Edmonton, Alta. In all cases infection was but a trace. The fungus resembles Helminthosporium cyclops Drechsler and the imperfect stage of Pleosphaeria semeniperda Brittlebank & Adam. Naturally infected seed did not germinate. As the author notes, the fungus is apparently new to Canada (I.L.C.). What appears to be the same fungus was isolated from a sample of grain grown near Edmonton (G.B. Sanford).

BASAL GLUME ROT (Pseudomonas atrofaciens). A trace of the disease was seen in 2 fields in S.E. Sask. (H.W. Mead).

STEM RUST (Puccinia graminis). A trace was found on winter wheat in the Raymond area, Alta., on 1 Aug. The only severe infection observed was on a variety of soft wheat near Turin. The first rust on spring wheat was observed on Red Bobs on 5 Aug. at Claresholm. Infection was 3-tr. 5-sl. 4-mod. 1-sev./139 fields in southern Alta. (M.N. Grant). No stem rust was found on wheat in central and northern Alta. in 1949 (T.R.D.). A trace of stem rust was recorded in 15 out of 245 fields examined in Sask. (H.W.M.). In striking contrast to the abundance of leaf rust on wheat in Man., stem rust was virtually absent from the varieties now commonly grown. It was not found until late in July and subsequent infection was light and largely confined to barley (T. Johnson).

According to Peturson (Sci. Agric. 29:230-236. 1949), the present yields of wheat in Man. and eastern Sask. are only possible because rust resistant varieties are grown almost exclusively. Moreover, stem rust of wheat apparently does not now spread as far northward or westward in Western Canada as it did before these varieties were generally grown. The introduction of resistant varieties has not appreciably affected the complex of the physiologic races of wheat stem rust, but has reduced the amount of inoculum. Susceptible varieties, however, are still subject to the rust hazard in spite of the protection afforded by the surrounding acreage of resistant varieties. Because of a definite change in the races of wheat leaf rust, this rust is about as prevalent as ever in the rust area.

Infection was generally light on winter wheat in Ont. A trace was observed in the spring wheat plots at O.A.C., Guelph (J.D. MacLachlan). Stem rust was first observed at Ste. Anne de la Pocatière, Que., on Little Club on 16 July. Later it became heavy on this variety, with traces on other spring wheats (A. Payette). Infection was only a trace in the fields examined in N.B. (J.L. Howatt), and slight on several varieties in the plots at the Station, Charlottetown, P.E.I. (D. Robinson). For additional observations see Rust Nurseries.

LEAF RUST (Puccinia triticina) was first observed in Alta. on Kharkov winter wheat at Lethbridge on 28 July (M.N. Grant). Infection 6-tr. 2-sl./37 fields of winter wheat and 66-tr. 90-sl. 18-mod. 2-sev./ 399 of spring wheat. It was general through southern and central Alta., being slightly more severe in the south. A tr.-mod. infection was present in the plots at Lacombe and Olds (T.R.D.). Leaf rust was more widespread and severe in Sask. than in 1948, being most prevalent in the eastern part. Infection was 24-tr. 21-sl. 9-mod. 30-sev./245 fields (H.W.M.). Leaf rust appeared in southern Man. in early June and thereafter spread quickly throughout the province until, by the end of July, it had reached epidemic proportions. As the infection was rather uniformly heavy from the southern border to the Swan River Valley it is likely that it caused some reduction in the general yield of wheat. Very little difference in varietal reaction was observed between Thatcher and the various Hope and H-44 derivatives (T. Johnson). Leaf rust infection was, in general, slight on the 1949 crop of winter wheat in Ont., but it was very prevalent on the newly-sown 1950 crop. A trace was observed on Cornell 595 in the plots, O.A.C., Guelph, in June (J.D. MacLachlan). Only a light infection was present on 3 fields of Cornell 595 at the C.E.F., Ottawa, on 6 July, whereas powdery mildew was mod.-sev. An even lighter infection occurred in 2 fields of Cascade (V.R. Wallen). Leaf rust heavily infected all varieties in the plots at Ste. Anne de la Pocatière, Que., but it came too late to cause serious damage (A. Payette). In general, leaf rust was heavy on wheat in Queens Co., P.E.I., in August (R.R. Hurst). See also under Rust Nurseries.

SPECKLED LEAF BLOTCH (Septoria Avenae f. sp. triticea). Infection was 1-tr. 2-sl./37 fields of winter wheat and 89-tr. 101-sl. 10-mod./399 of spring wheat examined in Alta. with tr.-mod. amounts in the

plots at Lacombe and Olds. The infection was generally slight in 1949 (T.R.D.). A light infection was widely distributed in Man. (T. Johnson). See also the discussion under Rust Nurseries.

GLUME BLOTCH (Septoria nodorum). A trace was seen in one field of winter wheat and infection was light in one and moderate in a second of spring wheat in Alta. (T.R.D.). The disease was present on 2 lots of wheat heads from Arcola, S.E. Sask.; the heads were mostly empty with a few shrunken kernels (H.W. Mead).

SPECKLED LEAF BLOTCH (Septoria Tritici). Infection was heavy and severe on the lower leaves of winter wheat in the plots, O.A.C., Guelph, Ont., when the crop was examined 5 May. Cornell 595 was highly susceptible. Pycnidia were found in great abundance (J.D. MacLachlan).

BUNT (Tilletia caries and T. foetida). Data obtained from the inspection records of the Board of Grain Commissioners from 1941 to 1949 inclusive indicate that bunt of wheat in Western Canada was less prevalent in 1948 and 1949 than in any previous year with the exception of 1941. The relatively small percentage of cars graded smutty during the first quarter of the present crop year (Table 1) indicates that the prevalence of bunt was not much higher this year than in 1948 (0.17% cars graded smutty for the first quarter, 1948).

Table 1. Wheat Bunt in Western Canada

Class of Wheat	Aug.1,1948 to July 31,1949			Aug. 1 to Oct. 31, 1949		
	Cars Inspected	Cars Graded Smutty	Percentage Graded Smutty	Cars Inspected	Cars Graded Smutty	Percentage Graded Smutty
Hard Red Spring	152,428	194	0.13	60,524	94	0.16
Amber Durum	9,002	18	0.20	3,584	30	0.84
White Spring	598	0	0.00	209	1	0.48
Alberta Red Winter	1,769	83	4.69	585	34	5.81
Garnet	2,666	2	0.08	821	0	0.00
Mixed Wheat	245	2	0.82	97	1	1.03
All Classes	166,708	299	0.18	65,820	160	0.24

Of the 20 collections of wheat bunt received from B.C. 15 proved to be dwarf bunt; however, most of these came from Armstrong. During a survey through the parkland area of Man., Sask. and Alta. to Edmonton and then south to Lethbridge bunt was found in one field in Man. and in several fields in southern Alta. out of 35 examined. In a survey confined to southern Alta., no dwarf bunt was found whereas ordinary bunt was present in 3 out of 139 fields of spring wheat and in 6 out of 8 winter wheat fields (W.J. Cherewick, W. Popp). Bunt was found only in southern Alta. as follows: infection 1-tr. 2-sl. 1-mod./199 fields of spring wheat (T.R.D.)

and 1-tr. 3-sl. 2-mod./25 of winter wheat. Dwarf bunt was not observed (M.N. Grant). Bunt was found in only one field out of 202 examined in Sask., being the least bunt seen for several years. The low infection was probably due mainly to weather conditions (H.W.M.).

Bunt was more prevalent in Ont. than usual and was severe in localized areas. One contributing factor for the increase is the assumption by growers that Cornell 595 is highly resistant not only to loose smut but also to bunt and consequently that seed treatment is unnecessary. One 250-bushel lot of untreated registered Cornell 595 was distributed in the Paincourt-Bearline district, Kent Co. Four fields seeded with about 100 bu. of this lot were surveyed at harvest time, 20 July. Bunt (T. foetida) affected 10-20% of the heads. The stems bearing affected heads were abnormally short; a large majority remained standing after the field was combined (J.D. MacLachlan).

TYPHULA BLIGHT (Typhula sp.). A disease of winter wheat, which resembles Typhula blight, caused severe damage in the Vanderhoof area, B.C. According to A.M. Johnson, District Agriculturalist, 90% of the plants were affected on over 100 acres of one farm. A considerable number of plants were also killed on an additional 400-500 acres in about a 6-mile square. The disease developed under rather special environmental conditions. There was little or no frost in the ground all winter with a good snow cover maintained until mid-April. The blight was confined mainly to the heavier silt and clay soils. Some farmers claim that the disease has occurred before to a lesser extent when it has been confined to shaded locations around bluffs where the snow lies longer than elsewhere in the spring (W.R. Foster).

LOOSE SMUT (Ustilago Tritici) was found in trace amounts only in a few fields in the Prairie Provinces (W.J. Cherewick, W. Popp). Infection was 3-tr. 1-sl./399 fields of spring wheat in Alta. (T.R.D.). A trace only was found in 2 fields in Sask.; the disease was very scarce (H.W.M.). In general loose smut infection was sl.-mod. on susceptible varieties in Ont. Infection ranged from 1-5% in 15 fields around Barrie, 2% in a field at Brantford and 1-5% about Guelph. In one field in Puslinch Twp., Wellington Co., 5-10% of the heads were affected (J.D. MacLachlan). A single sample of loose smut was brought in to the laboratory, Charlottetown, P.E.I. (R.R. Hurst).

BACTERIAL BLACK CHAFF (Xanthomonas translucens). A trace infection was observed in one field in Alta. (A.W. Henry). In southern Alta. the disease developed as a leaf blight of spring wheat to an unusual degree. Infection was 2-tr. 5-sl. 5-mod. 4-sev./139 fields. It was most severe in the Brooks area (M.N. Grant).

OATS

ERGOT (Claviceps purpurea). A trace was present in a seed sample of Garry oats from Zealandia, Sask. (M. Champlin).

ANTHRACNOSE (Colletotrichum graminicola) was observed in six districts of Sask. The lower affected leaves appeared reddish from a distance. Infection was light except at West Humboldt, where it was mod. and damage sl. (T.C. Vanterpool).

COMMON ROOT ROT (Fusarium spp.). Infection was 5-tr. 3-sl. 1-mod. 1-sev./153 fields in Alta. The infected fields were in the Peace River district between Beaverlodge and Dawson Creek, B.C. (T.R.D.). The disease was reported in 9 fields in Sask.; infection was 5-tr. 2-sl. 2-mod. (H.W.M.).

LEAF BLOTCH (Helminthosporium Avenae). Infection was 54-tr. 13-sl. 2-mod./153 fields examined in Alta. (T.R.D.). A trace of infection was observed at Lanigan, Sask.; spores were present (T.C. Vanterpool). Infection was, in general, light in Ont. (J.D. MacLachlan).

HELMINTHOSPORIUM BLIGHT (H. victoriae). A third of the Garry oat plants in a variety test plot at Manor, Sask., were blighted prematurely by July 5. The other varieties were reported free from the trouble. Isolations following disinfection yielded more isolates of Fusarium than H. victoriae. It is suggested that Garry may also be more susceptible to Fusarium root rot than the other commonly grown varieties of oats (T.C. Vanterpool). Blight was prevalent on Garry and Beacon oats in the plots and foundation plantings in Man. Only a light attack developed in fields of these varieties (J.E. Machacek). Blight and root rot was mod.-sev. on the susceptible varieties Beacon, Vicland, and Garry, in Ont. (J.D. MacLachlan).

HALO BLIGHT (Pseudomonas coronafaciens). Infection was 82-tr. 36-sl./153 fields examined in Alta. and tr. in all varieties in the plots at Olds and Lacombe (T.R.D.); and 9-sl. 4-mod./63 fields, mostly located in west-central and east-central Sask., where it was about equally prevalent in 1948 (H.W.M.).

CROWN RUST (Puccinia coronata). Infection was 1-tr. 2-sl./63 fields in Sask. being lighter than in 1948 (H.W.M.). Infection by crown rust appeared late and was generally light in Man. (T. Johnson). Crown rust caused, in general, light to moderate infections in Ont. (J.D. MacLachlan). Crown rust was light in Que. (O. Caron). In the fields visited in eastern Que., a light infection on Banner was found only at Sacré Coeur, Rimouski Co. (H. Généreux). Only a trace of crown rust was found in oat fields in York, Sunbury, Kings, Carleton, Victoria, Kent and Westmorland Counties, N.B. (J.L. Howatt). In mid-August some fields were almost free from crown rust in Queens Co., P.E.I., while others showed upwards of 90% infection. The distribution suggested localized sources of infection (D. Robinson).

During a survey made later across P.E.I., crown rust was found everywhere and a few late fields were heavily infected (R.R. Hurst). For further observations see Rust Nurseries.

STEM RUST (Puccinia graminis) appeared late in Man. and infection was generally light (T. Johnson). Stem rust was also light in Ont. (J.D. MacLachlan). In P.E.I., on 15 Aug. stem rust infection varied from a trace to 100% (D. Robinson) and became very heavy in late fields in September (R.R. Hurst). See also Rust Nurseries.

SPECKLED LEAF BLOTCH (Septoria Avenae) was found in Alta. in only 5 fields of 153 examined, infection being 3-tr. 2-sl. (T.R.D.). See also Rust Nurseries.

SMUTS (Loose Smut, Ustilago Avenae and Covered Smut, U. Kolleri). Up to 5% infection of loose smut were found in most oat fields in the northern Okanagan Valley, B.C.; covered smut was also present, but in fewer fields (G.E. Woolliams). Oat smut was recorded in 8 fields in Alta.: 1-tr. 5-sl. 2-mod. (T.R.D.). Covered smut was found in 25 out of 63 fields in Sask.; av. infection 2%, with 20% the maximum.

Loose smut, which is relatively scarce in Sask., was found infecting 3 fields, infection being about 2% in 2 fields and 10% in one. (H.W.M.). Smut infection was generally light in Ont. (J.D. MacLachlan). A trace of loose smut was present in 2 fields of Beaver in Carleton Co., Ont. (V.R. Wallen). Both smuts were found in many fields in York, Carleton and Victoria Counties, N.B., infection being 0-1% (J.L. Howatt). Covered smut was quite general in 6 widely scattered localities visited in P.E.I.; av. infection 2% (D. Robinson).

BLAST (non-parasitic) was 43-tr. 102-sl. 6-mod./153 fields in Alta. and sl.-mod. in the variety plots at Lacombe and Olds (T.R.D.). Damage was 19-tr. 4-sl. 2-mod. 1-sev./63 fields in Sask.; and was less severe than in 1948 (H.W.M.).

GREY SPECK (manganese deficiency) was found in a field of oats west of Spaulding, Sask., on 10 Aug. Oat plants of the variety Exeter grown in the greenhouse in soil from Spaulding developed typical grey speck symptoms, whereas another group of plants so grown but sprayed with manganese sulphate remained unspotted. Several oat fields in the area were affected by grey speck, which was most severe and destructive to oats on new breaking. Successive oat crops after breaking showed less and less of the disease. The disease has been looked for since my coming to Sask. in 1928 and was undoubtedly collected before. However, in previous attempts to prove its existence grey speck failed to develop on plants grown in the soil under greenhouse conditions. It is possible that the oat variety used was unsuitable as varieties vary considerably in their response to manganese deficiency (T.C. Vanterpool). Grey speck caused an estimated 30% loss in yield in a field of Ajax oats at Oak Bank., Man., although this is one of the more resistant varieties. Grey speck was observed at Prawda, the eighth district in which it has been found (W.A.F. Hagborg). Grey speck was observed in 10 fields in Kings and Queens Counties, P.E.I., causing a trace to moderate damage (R.R. Hurst).

BARLEY

ERGOT (Claviceps purpurea). A sample of barley received from Shuswap, B.C., contained about 30% ergot (W.R. Foster). Ergot was very scarce this year, infection being 4-tr. 1-sev./355 fields examined in Alta. (T.R.D.). A heavy infection was also reported in a field at Berwyn, Peace River district (A.W. Henry). A trace was found on Glacier in the plots at Saskatoon, Sask. (H.W.M.). A light infection was found in Ont. (J.D. MacLachlan). A trace was recorded twice in P.E.I. (R.R. Hurst).

POWDERY MILDEW (Erysiphe graminis) was reported as follows: tr.-sl. infection 2 fields in southern Alta. (T.R.D.); heavy infection on several hybrid lines in the Laboratory cereal plots, Winnipeg, Man. (A.M. Brown); moderate infection in Ont., but less than in 1948 owing to adverse weather conditions and on Arion winter barley in the O.A.C. plots in June (J.D. MacLachlan); traces on several varieties sown at Notre Dame du Lac, Témiscouata Co., Que. (A. Payette); and light infection on several varieties in the plots at Charlottetown, P.E.I. (D. Robinson).

HEAD BLIGHT (Fusarium spp.). Two collections of head blight were obtained and the organisms present determined. Infection was heavy in Velvet at Normandin, Que.; 74 kernels from 16 spikes examined: Fusarium avenaceum (28 isolates), F. graminearum (18), F. Poae, F. sambucinum f. 1, F. Scirpi var. acuminatum (1 each). F. Poae was also isolated from a sample from Winnipeg, Man. (W.L. Gordon).

COMMON ROOT ROT (Helminthosporium sativum and Fusarium spp.). Infection was 5-tr. 10-sl. 2-mod. 1-sev./355 fields in Alta. (T.R.D.); and 3-tr. 7-sl. 18-mod. 7-sev./35 fields in Sask. (H.W.M.). Common root rot was severe at Smeaton and very severe in spots in the field at Lac Vert. These outbreaks developed under high moisture conditions. A similar case was reported on barley at Nipawin on 14 Sept. 1945 (P.D.S. 25:13) (T.C. Vanterpool).

SPOT BLOTCH (Helminthosporium sativum). Infection was 3-tr. 6-sl. 2-mod./355 fields in Alta. (T.R.D.). It was common in Man., but was not generally severe (T. Johnson).

NET BLOTCH (Helminthosporium teres). Infection was 22-tr. 15-sl. 2-mod./355 fields in Alta. (T.R.D.); 2-sl. 1-mod. 2-sev. in eastern Sask. and mod. in the plots at Melfort (H.W.M.). Net blotch was the most conspicuous leaf spot of barley in Man. in 1949. It was prevalent throughout the province and considerably more abundant than in the preceding two years.

STEM RUST (Puccinia graminis). A slight infection was noted in one field in southern Alta. (T.R.D.); and a trace was recorded in 2 fields in S.E. Sask. (H.W.M.). A light infection occurred late in the season on barley in Man. (T. Johnson). Infection was in general slight in Ont., but it was moderate in some of the O.A.C. plots (J.D. MacLachlan). Infection

was a trace on most varieties at Notre-Dame du Lac, Que., and slight on the same set at Ste. Anne de la Pocatière (A. Payette). See also Rust Nurseries.

LEAF RUST (Puccinia Hordei). A moderate infection occurred in one field in S.E. Sask. (H.W.M.). Leaf rust was found in south and central Man. but only in trace amounts (T. Johnson). Leaf rust was generally light in Ont., but infection was sl.-mod. on Arion, and tr.-sl. on Wong, winter varieties in the plots, O.A.C., Guelph (J.D. MacLachlan). Leaf rust was tr.-sl. on the varieties at Notre-Dame du Lac and Ste. Anne de la Pocatière, Que. (A. Payette). Leaf rust was light to heavy on Charlottetown 80 and other varieties in P.E.I. (D. Robinson). See also Rust Nurseries.

SCALD (Rhynchosporium Secalis). Infection was 65-tr. 73-sl. 17-mod. 5-sev./355 fields in Alta. and sl.-mod. in the variety plots at Lacombe and Olds (T.R.D.). Infection was light in one field and severe in another at Birch Hills, Sask.; it was also light in the plots at Scott and moderate at Melfort (H.W.M.). Slight infections were recorded at Spruce Home and Pontrilas (T.C. Vanterpool). Some plots at O.A.C., Guelph, Ont., were moderately infected, but the damage was slight (J.D. McLachlan).

SPECKLED LEAF BLOTCH (Septoria Passerinii). Infection was 23-tr. 13-sl. 1-mod./355 fields in Alta. (T.R.D.). The disease was found here and there in Man., mostly as trace or light infections. Only one heavily infected field was recorded. This disease was much less prevalent in 1949 than in the 2 or 3 preceding years probably owing to warm, dry weather, unfavourable to its establishment (T. Johnson). See also Table 3.

COVERED SMUT (Ustilago Hordei) was found in some fields in the north Okanagan Valley, B.C. (G.E. Woolliams). Infection was 39-tr. 16-sl. 3-mod. 3-sev./355 fields in Alta. (T.R.D.); and was 25-tr. 5-sl. 1-mod. 2-sev./190 fields examined during a special survey by the University staff in central Alta. (H.W. Henry). Covered smut was a little less prevalent in Sask. than in 1948; infection was a trace in 6 fields, sl. in 2 and 3-11% in 4 out of 38 examined and averaged 1% (H.W.M.). Infection ranged from tr. to 2% in the fields examined in P.E.I. (R.R. Hurst).

LOOSE SMUT (Ustilago nuda) was present in some fields in the north Okanagan Valley, B.C. (G.E. Woolliams). Loose smut infection was 75-tr. 28-sl. 4-mod./355 fields in Alta. and tr.-sl. in most varieties in the plots at Lacombe. Newall alone was infected at Olds (T.R.D.). During a special smut survey in central Alta. infection by U. nuda was 49-tr. 3-sl. 1-mod./190 fields, being not as severe as in 1945. Titan was moderately infected at Rimbey. U. nigra was found in trace amounts in 2 fields. The identity of the organisms was checked in all cases by a laboratory examination (A.W. Henry). Loose smut was relatively widespread in Sask., being present in 25 of the 38 fields examined. Infection was light, averaging 2%, but the two species were not separated (H.W.M.).

Some 190 fields of barley and oats were inspected during a survey through Man. and across Sask. and Alta. to Edmonton and then south to Lethbridge. The average smut infection was 1.8% in oats and 2.4% in barley, the percentage of infected heads in each crop being very similar in Man. and Sask. and only fractionally less in Alta. However, the prevalence of the different species of smut was significantly different. In Man. the covered and loose smuts of oats were present in approximately equal proportions, while loose smut decreased in prevalence westwards until in Alta. it was very scarce. Similarly the loose and false loose smuts of barley, particularly the latter, decreased in prevalence from Man. to Alta. In Man. about half the barley and oat seed was treated for smut. The effectiveness of the various seed dressings is shown in Table 2. (W.J. Cherewick, W. Popp). The number of seed lots treated with Panogen is too small, but this product appears to be promising. The slightly better results with Ceresan over Leytosan agree with those obtained in controlled experiments (I.L.C.).

Spore-load in seed	Percentage of smut in the field, excluding barley loose smut						
	Untreated (186 fields)	Ceresan (75 fields)	Leytosan (60 fields)	Formald. (39 fields)	Panogen (10 fields)	Bluestone (4 fields)	Mean
Trace	0.43	0.08	0.09	0.32	nil	nil	0.26
L to H	1.94	0.41	0.53	1.78	tr 1/	1.17	1.34
Mean	1.57	0.30	0.39	1.20	tr	0.88	1.04

1/ Only one field contained a trace of smut.

Loose smut was generally light to moderate in Ont. (J.D. MacLachlan). It affected 6% of the heads in a field of O.A.C. 21 at Kapuskasing (V.R. Wallen). Traces of both loose and covered smut were found in many fields in York, Sunbury, Victoria, Albert and Carleton Counties, N.B. In one field in Carleton Co., 60% of the heads were affected by covered smut (J.L. Howatt).

BACTERIAL BLIGHT (Xanthomonas translucens) was unusually prevalent in Alta. in 1949. Infection was 52-tr. 36-sl. 5-mod. 1-sev./355 fields inspected (T.R.D.) and sl.-mod. in the variety plots at Lethbridge (M.N. Grant). In the seed drill sample plots at Edmonton, infection was tr.-mod. in 237/364 samples. This infection became noticeable about 2 weeks after a very heavy rain in mid-July (A.W. Henry). Traces were observed on several varieties sown at Notre-Dame du Lac, Que. (A. Payette).

HEAD BLIGHT (?bacteria). Infection was 8-tr. 8-sl. 2-sev./190 fields in central Alta. (A.W. Henry).

RYE

ERGOT (Claviceps purpurea) infection was as follows: 8-tr. 2-sl. 1-mod./26 fields in Alta. and tr. in the plots at Lethbridge and Olds, being unusually scarce in Alta. this year (T.R.D.); trace in one field at Touchwood, Sask. and in the plots at Melfort (H.W. Mead); over 10% of the heads were affected in a field near Codette and although ergot was rare in 1949, this field was the most heavily infected seen for a long time (T.C. Vanterpool); heavy on fall rye, variety Rosen, at Winnipeg, but absent in adjacent plots of spring rye--apparently the flowering period of the spring rye did not coincide with the ascospore shower (A.M. Brown); trace only in Queens Co., P.E.I. (R.R. Hurst).

COMMON ROOT ROT (Helminthosporium sativum and Fusarium spp.). Infection was 1-tr. 2-sl. 1-mod. 1-sev./26 fields in Alta. (T.R.D.); and 1-tr. 2-sl. 1-mod./6 fields in Sask. (H.W.M.).

TAKE ALL (Ophiobolus graminis). A trace was found in 2/26 fields in Alta. (T.R.D.).

STEM RUST (Puccinia graminis). A trace was present in one field at Touchwood, Sask. (H.W.M.).

LEAF RUST (Puccinia secalina) was severe in one field at Touchwood, Sask. (H.W.M.). A light infection was noted at East Baintree, Man, (W.A.F. Hagborg).

SPECKLED LEAF BLOTCH (Septoria Secalis). Infection was 4-tr. 1-sl./26 fields in Alta. (T.R.D.).

BACTERIAL BLIGHT (Xanthomonas translucens). A slight infection was observed at La Rochelle and Winnipeg, Man. (W.A.F. Hagborg).

RUST NURSERIES IN CANADA IN 1949

T. Johnson, B. Peturson, A.M. Brown and G.J. Green

In Table 3 is shown the incidence of the cereal rusts and of certain other plant diseases on wheat, oat, and barley varieties grown in the rust nursery plots at 31 places across Canada in 1949. Separate tables were prepared for the cereal rusts and powdery mildew of wheat giving the disease intensity on each variety in the plots, but the complete report, mimeographed separately, must be consulted for these details.

Twelve varieties of wheat, six of oats, and four of barley were grown. The varieties were: wheat - McMurachy, Hope x Timstein R.L. 2477, Carleton, Little Club, Marquis, Spellmar, Thatcher, Vernal, Norka, Redman,

Exchange, (Illinois x Chinese) x Timstein R.L. 2537; oats - Bond, Trispernia, Ajax, Vanguard, Garry, Clinton; and barley - Goldfoil, Gold, Vantage, and H. 106 (Wisconsin).

It should not be inferred that the absence of any disease from a given rust nursery means that the disease was not present in that locality. The plant material was shipped to Winnipeg for examination, and observations were therefore limited to the material received, which, in most cases, consisted of only a handful of plants from each row. It should not be inferred either that the cereal diseases recorded in Table 3 were the only ones that occurred in the nurseries. The presence of spot blotch of wheat and barley (Helminthosporium sativum), net blotch of barley (H. teres), and leaf blotch of oats (H. Avenae) was noted in some nurseries, but time did not permit the examination of the plants for these and other diseases.

The Cereal Rusts

Wheat stem rust was generally light throughout Canada in 1949. Only in the rust nursery at Fort William, Ont., was a heavy infection recorded though a moderate infection was observed in several others in Ont. In Man. stem rust was not found until late in July and subsequent infection was light and largely confined to barley. In eastern Sask., it occurred in trace amounts only. In southern Alta., stem rust was first found on 1 Aug. and a light infection was later observed on wheat and barley in the Lethbridge and Brooks areas.

Leaf rust of wheat was moderate or heavy in nearly all the rust nurseries except those in western Sask. and Alta. It appeared, in Man., in early June and spread quickly through the province and adjacent parts of Sask. Heavy rust infection developed throughout Man. and extended into eastern Sask., particularly the Carrot River Valley. Lighter infection extended as far west as Edmonton, Alta. In southern Alta., leaf rust was first found in the Lethbridge area on 28 July. Infection was generally light and diminished to trace amounts north of Lacombe. It was also very light or absent in southwestern Sask. In Eastern Canada heavy leaf rust infection developed in a number of localities.

Infection by stem rust and crown rust of oats was generally light. In Man. both rusts appeared late and caused only light infection. Both rusts were found in eastern Sask., but infection by stem rust was light and crown rust occurred in trace amounts only.

Light to moderate infection by leaf rust of barley occurred at several places in Eastern Canada. West of the Great Lakes the rust was found in slight amounts only in Man. and B.C.

In connection with the heavy infection of stem rust of barley recorded in Table 3 for Fredericton, N.B., it may be noted that the rust responsible was not wheat stem rust but rye stem rust.

Other Diseases

Powdery mildew (Erysiphe graminis) was relatively scarce on wheat in 1949, being found in only 6 nurseries as compared with 16 in 1948. On barley it was observed in only two nurseries, Agassiz, B.C., and Kemptville, Ont. No mildew was observed on oats in any of the nurseries.

Diseases caused by Septoria spp. were also relatively scarce possibly because of the dry, warm weather that prevailed over much of Canada from spring to midsummer. Speckled leaf blotch of oats (S. Avenae) was, however, found in light or moderate amounts in many of the rust nurseries in Eastern Canada.

PHYSIOLOGIC RACES OF CEREAL RUSTS IN CANADA IN 1949

T. Johnson, B. Peturson, A.M. Brown and G.J. Green

This report gives the distribution in Canada, in 1949, of physiologic races of the following rusts of cereals: Puccinia graminis var. Tritici, Puccinia graminis var. Avenae, Puccinia triticina, Puccinia coronata var. Avenae, Puccinia Hordei. Included also is a brief record of studies carried out with collections of aecia made on barberry and buckthorn.

For the development of cereal rusts in Canada in 1949, the report on the Rust Nurseries may be consulted.

Distribution of Physiologic Races of the Cereal Rusts

From the 100 isolates of wheat stem rust (Puccinia graminis var. Tritici) studied 12 physiologic races were isolated: 69 isolates of race 56, 12 of race 38, 5 of race 17, 5 of race 29, 2 of race 36, and 1 of each of races 1, 16, 19, 32, 39, 48, and 80. The chief difference between the racial distribution this year and in 1948 is that the considerable prevalence of races 17, 29, and 38 in 1948 was not repeated in 1949. These three races, which in 1948 accounted for about 50% of all isolates, comprised in 1949 only 22% of them. This year, race 56 resumed its high predominance of former years, accounting for 69% of all isolates as compared with 42% in 1948. It is rather a remarkable fact that of the 45 isolates from the Prairie Provinces 44 belonged to race 56.

In Eastern Canada race 56 was also the most common race but its predominance was much less pronounced. Race 38, as in most former years, was second in order of prevalence. The occurrence of races 16 and 36, collected at Appleton, Ont., is possibly related to the presence in that locality of numerous barberry plants.

The collections from B.C. were limited to the vicinity of Creston. The race isolations indicate a race distribution in that area considerably different from that prevailing east of the mountains and distinctly more varied (T. Johnson).

Table 3. Incidence of certain pathogenic fungi on wheat, oats and barley grown at 31 localities in Canada in 1949.

Locality	Wheat						Oats			Barley			
	P. gr. Tritici	P. triticina	Erysiphe graminis	Septoria nodorum	S. Avenae f.sp. triticea	Fusarium spp. (Scab)	P. gr. Avenae	P. coronata Avenae	Septoria Avenae	P. graminis	P. Hordei	Erysiphe graminis	Septoria Passerinii
Saanichton, B.C.	0	3	3	0	0	0	0	0	0	0	0	0	0
Creston, B.C.	3	4	0	0	0	0	0	0	0	2	1	0	0
Agassiz, B.C.	0	4	0	0	0	1	1	0	3	0	3	4	0
Beaverlodge, Alta.	0	0	3	1	1	0	0	0	0	0	0	0	0
Edmonton, Alta.	0	2	3	0	0	0	0	0	0	0	0	0	0
Lethbridge, Alta.	0	1	-	-	-	0	0	0	-	0	0	-	-
Scott, Sask.	0	2	0	0	0	0	0	0	0	0	0	0	0
Melfort, Sask.	1	4	0	0	0	0	0	0	0	0	0	0	0
Indian Head, Sask.	1	4	0	0	1	0	1	0	0	0	0	0	0
Brandon, Man.	2	4	0	0	1	0	1	1	0	2	0	0	2
Winnipeg, Man	3	4	-	0	2	0	2	3	0	2	3x	-	2
Morden, Man.	2	4	-	-	1	0	2	0	0	1	0	-	0
Ft. William, Ont.	4	4	0	0	0	0	2	2	4	3	0	0	0
Kapuskasing, Ont.	2	3	0	0	0	0	1	0	3	1	0	0	3
Mindemoya, Ont.	3	4	0	3	1	0	1	3	3	2	3	0	0
St. Catharines, Ont.	1	3	0	0	0	1	0	0	0	1	0	0	0
Guelph, Ont.	2	3	3	0	0	0	1	1	0	2	0	0	0
Appleton, Ont.	3	4	0	0	2	0	3	2	1	3	4	0	0
Ottawa, Ont.	3	4	3	0	1	0	1	2	1	1	2	0	0
Merrickville, Ont.	2	4	0	0	0	0	2	2	0	2	3	0	0
Kemptville, Ont.	2	4	4	0	0	0	1	3	2	2	1	3	0
Williamstown, Ont.	2	4	0	0	0	1	0	1	0	0	0	0	0
Macdonald College, Que.	1	4	0	0	0	0	0	1	2	1	0	0	0
L'Assomption, Que.	2	4	0	0	0	0	1	1	0	2	2	0	0
Lennoxville, Que.	2	4	0	0	0	1	2	1	3	2	0	0	0
Normandin, Que.	0	4	0	3	0	2	1	0	3	0	2	0	4
Ste. Anne de la Pocatière, Que.	1	4	0	0	1	0	0	4	3	2	2	0	0
Fredericton, N.B.	0	4	0	1	0	0	0	4	0	4	0	0	0
Kentville, N.S.	0	3	0	0	0	0	1	1	2	2	0	0	0
Pictou, N.S.	0	2	0	0	0	0	0	2	0	0	0	0	0
Charlottetown, P.E.I.	1	4	0	0	1	0	1	0	2	0	2	0	0

xArtificially created epidemic.

Note: 1 = trace; 2 = light; 3 = moderate; 4 = heavy.

The identification of races of Puccinia triticina was carried out by the use of the reduced set of differential hosts agreed on at a meeting of Canadian and American investigators of leaf rust in St. Paul, Minn., in February, 1948. The dropping of the differential hosts, Carina, Brevit and Hussar and the use of a dichotomous key reduces the number of races from 130 to 24. Little difficulty was experienced in relating the races of the new key to those of the old and such doubts as arose were resolved by checking with the three discarded hosts.

The procedure followed in race determination differed in one respect from that of preceding years. Each rust collection, after increase on the susceptible host, Little Club, was inoculated to a "screening set" of accessory hosts comprising the varieties Exchange, Hope x Timstein, Gabo, and R.L. 2520 (Frontena x (R.L. 2265 x Redman^2)), all of which have a high degree of leaf rust resistance. Any large pustules observed on these varieties were used for study of the race or races involved. The screening set served the purpose of calling the investigator's attention to any races that might be a threat to the new sources of leaf rust resistance now used by plant breeders. It is not necessarily intended that the screening set should be the same from year to year but rather that it should contain varieties currently used as sources of leaf rust resistance.

The physiologic race distribution in 1949 did not differ greatly from that of the previous year. The races have been numbered according to the "Unified Numeration" of a new key, but the old number corresponding to each of these new numbers is also given.

The 361 isolates studied were identified as follows (number of isolates in brackets): UN 1= races 1 and 1a (25); UN 2= races 15 and 15a (71); UN 3= races 3 and 58 (43); UN 5= race 5a (92); UN 6= races 126 and 126a (91); UN 9= race 9 (9); UN 10= race 11 (17); UN 11= race 93 (1); UN 14= race 128a (4); UN 16= race 33 (8). The letter "a" is used to designate isolates virulent to Hope and H-44 derivatives.

UN 3 (race 58) was the predominant race in Eastern Canada. In Man. and Sask. UN 2 (race 15a), UN 5 (race 5a) and UN 6 (race 126a), which are virulent to wheats of Hope or H-44 derivation, were present almost to the exclusion of other races. In southern Alta. and B.C. these races were present also (though it may be noted that the isolates of UN 2 from B.C. corresponded to race 15 rather than 15a) but the predominant races were UN 1 (race 1), UN 10 (race 11), and UN 16 (race 33). It seems clear that much of the leaf rust in this area does not come from the same source as the rust found in the eastern prairie region. This source is probably the Palouse area of Washington and Idaho. It is worth noting that the screening sets clearly differentiated the rust collections made in southern Alta. and around Creston, B.C. from other collections. Collections from this area attacked the varieties Gabo and Hope x Timstein more or less heavily, whereas other Canadian collections did not (T. Johnson, A.M. Brown).

No significant change has occurred in the past year in the distribution of the physiologic races of oat stem rust (Puccinia graminis var. Avenae). From the 79 isolates studied 10 physiologic races were isolated: 24 of race 10, 18 of race 8, 15 of race 2, 7 of race 11, 6 of race 5, 4 of race 1, 2 of race 6 and 1 each of races 4, 7 and 13. In terms of the isolates identified it might appear as if the race group 8, 10, 11 had gained a considerable predominance over the race group 1, 2, 5, the

common races of former years. However, by considering only those collections made on varieties that exercise no selective action it appears that the two race groups are present in almost equal concentration. The isolates of races 4, 6 and 13 came from areas in which barberry occurs and may, consequently, have originated on this host (T. Johnson).

A very definite change is taking place in the relative prevalence, in Canada, of the various physiologic races of crown rust (Puccinia coronata var. Avenae). The races isolated in 1949 with the number of isolates of each in curves were as follows: Race 1 (4 isolates), race 2 (24), race 3 (13), race 4 (4), race 5 (1), race 6 (2), race 34 (29), race 38 (1), race 45 (8), and race 57 (8). Prior to 1947 the races that attack Bond and Clinton (races 34, 45, 57) were quite rare. In some years they were not collected at all and they never comprised more than a small fraction of the isolates identified. The first increase in the prevalence of these races occurred in 1947 when they comprised 4% of all isolates. In 1948 they comprised about 20% of all isolates and in 1949 they increased still further, constituting about half of all isolates identified. The increase in these races is no doubt due to the increased acreage in the United States devoted to varieties derived from Bond. The Bond derivatives are, as a rule, immune to the common crown rust races but susceptible to races 34, 45 and 57, and, therefore, tend to favour the increase of these races and to suppress the increase of the common races.

In all, 10 distinct physiologic races of crown rust were isolated by use of the standard differential oat varieties. However, by using R.L. No. 2065, Saia C.I. 4629, and Ukraine C.I. 2359 as additional hosts, it was possible to distinguish four biotypes of race 2, four biotypes of race 3, two biotypes of race 4, two biotypes of race 38, and four biotypes of race 34. This expanded differential host set showed the presence of 21 races and biotypes in the cultures studied (B. Peturson).

Barley leaf rust (Puccinia Hordei), although not severe in 1949, was present on barley in Que., Ont., Man. and B.C. Several collections were made in each of these provinces, all of them from the variety Vantage. It is of particular interest that most of the physiologic races isolated from Vantage were races that are not recorded in the International Register, recently compiled by M.N. Levine and W.J. Cherewick. Races 44 and 49 occurred in Que., while in Ont. race 4 only occurred. A new race was isolated from a collection made in Que. and the races occurring in Man. and B.C. were also races not hitherto encountered.

To a new race collected at Winnipeg, the varieties Campana, Newal, Frontier, Gem, Montcalm, Plush, Rex, Byng, Wisconsin 38, Velvon, Feebar, Tregal, Vantage and Titan, all were susceptible, but to race 44, collected in Que., Frontier, Gem and Feebar were resistant, while all of the other varieties just mentioned were susceptible (A.M. Brown).

The Relative Prevalence of Varieties Tritici and Secalis of P. graminis on Barley.

In view of the fact that barley is attacked not only by P. graminis var. Tritici (wheat stem rust) but also by P. graminis var. Secalis (rye stem rust) it was thought advisable to test stem rust collections made on

barley for the presence of both rusts. In a total of 37 collections on barley, var. Tritici alone occurred in 23 collections, var. Secalis alone in 6 collections, and both varieties together in 8 collections. The isolates of var. Secalis occurred in collections from B.C., Alta., Man., Ont., Que., and N.B. In one locality only, Fredericton, N.B., was there evidence that barley was severely rusted by var. Secalis. Although var. Secalis is widely distributed in Canada it is definitely of importance secondary to that of var. Tritici (T. Johnson).

Infection Studies with Aecia from Berberis and Rhamnus in 1949

Isolations from Aecia on Berberis

Isolations from 15 collections of aecia from Eastern Canada produced only varieties Secalis and Agrostidis of Puccinia graminis. Only var. Agrostidis occurred in the 7 collections from the Maritime Provinces, and this variety was present also in 2 of the collections from Ont. and in 1 from Que. In these two provinces, however, var. Secalis, which occurred in 6 of the 8 collections, was the predominant one (T. Johnson).

Isolations from Aecia on Rhamnus species

Aecial collections were obtained on Rhamnus cathartica from P.E.I., N.B., Que., Ont., and Man., on R. saxatilis and R. tinctoria in Man. and on R. Frangula in N.B. From the 17 collections on R. cathartica, Puccinia coronata var. Festucae was isolated from 2 collections, var. Avenae from 11 collections, and a variety tentatively designated as Bromi (Muehleth.)[x] from 7 collections. Var. Bromi was isolated also from collections made on R. saxatilis and R. tinctoria. Puccinia coronata var. Agrostis was the only variety of crown rust isolated from R. Frangula.

The following physiologic races of the variety Avenae were isolated from the 11 above mentioned collections of that variety: race 2 (3 isolates), race 3 (7), race 6 (3), race 38 (2), and race 4 (1).

Two of the isolates of var. Bromi, one from R. saxatilis at Morden, Man., the other from R. cathartica at Kemptville, Ont., were tested for pathogenicity to several varieties of cereals. The results demonstrate the existence of physiologic races within var. Bromi (B. Peturson).

[x]Owing to the ability of this strain to attack rye, barley, and even wheat, as well as certain species of Bromus, its proper nomenclature must be left for future decision.

II. DISEASES OF FORAGE AND FIBRE CROPS

ALFALFA

BLACK STEM (Ascochyta imperfecta). Leaf and stem infection estimated as 26-tr. 24-sl. 2-mod./87 fields in Alta. The greatest infection occurred in the Lethbridge district (J.E.J. Thomson). Whereas infection was sl.-sev. in 3 fields in central Alta., it was heavier in the Peace River district, being 5-tr. 6-sl. 11-mod. 2-sev./ 80 fields (J.B. Lebeau, D.A. McTavish). Infection was light in all areas in Sask., being mod. in only 2 fields and tr.-sl. in the other 48 examined. The disease began to develop rather rapidly on leaves and stems in May, but it was then checked by drought and several severe frosts in the latter half of May. In spite of frequent showers and cool weather in June, disease development was slow. The early growth of alfalfa had been killed back severely and the new growth remained almost free from infection until mid-August, defoliation being much less than usual when the crop was cut (H.W.M.).

Mature pycnidia were present on old stems collected 17 May from the affected field at Hespeler, Ont., reported in P.D.S. 48:16. A survey of the O.A.C. plots, Guelph, in October revealed mature pycnidia on all old stems of several plantings and much blackening of the new stem growth, believed to be due to this organism (J.D. MacLachlan). A few plants were affected in a field at the C.E.F., Ottawa (V.R. Wallen).

WINTER CROWN ROT (low-temperature basidiomycete). Damage from winter crown rot was estimated as follows:

District	Fields Examined	Fields Damaged				
		Tr.	Sl.	Mod.	Sev.	Total
		%	%	%	%	%
Peace River	80	19	18	1	-	38
Central Alta.	77	12	40	30	1	83
Clover Bar	83	6	37	22	8	73
Southern Alta.	87	15	46	26	3	90
All Districts	327	12	35	20	3	70

Damage was slightly less in southern Alta. than usual, although partial rotting of the crowns caused a weakening of the plants in most fields examined (J.E.J. Thomson). Damage in the Clover Bar district and central Alta. was considerably less than last year. Tr.-sl. infection was found in several fields in the Peace River district (J.B. Lebeau, D.A. McTavish).

Winter crown rot caused less damage in Sask. than in 1948. Out of 50 fields examined infection was a trace in 21%, sl. in 68%, and mod. in 3%. The disease occurred mostly on single plants or in small patches. Two important seed-producing districts, Mistatim and Erwood, were surveyed for the first time. That they had suffered considerable reduction in stand in previous years from winter crown rot

was indicated by a characteristic patchiness and weed infestation. A common observation of the growers in these districts was that patches killed out by the disease remained barren of all growth for most of a season and then became infested with weeds (H.W.M.).

BACTERIAL WILT (Corynebacterium insidiosum). A sl.-mod. infection was found in 2 fields near Creston, B.C. (M.R. Foster). In 6 non-irrigated fields examined in the same area infection was 2-mod. 3-severe (J.E.J. Thomson). The disease is causing fields of alfalfa in Grand Forks area to die out in 3-4 years after seeding (G.E. Woolliams).

Damage from bacterial wilt in Alta. was estimated as follows:

District	Fields Examined	Fields Damaged Tr.	Sl.	Mod.	Sev.	Total
		%	%	%	%	%
Peace River	80	4	1	-	-	5
Central Alta.	77	5	4	-	-	9
Clover Bar	83	8	11	6	4	29
Southern Alta.	87	21	14	21	14	70
All Districts	327	10	8	7	5	30

Bacterial wilt was found in all irrigated fields inspected 3 years old or older, in southern Alta. (J.E.J. Thomson). In central Alta. and the Clover Bar district infection seemed to be much less than last year. Trace infection was suspected in a few fields examined near Falher, in the Peace River district (J.B. Lebeau, D.A. McTavish). No new infestations were found in Sask. The variety plots at Melfort are all infected and have been for several years, but the stand is still good and growth is moderately good. The disease has persisted in clones tested at Edmonton, planted in the field at Saskatoon, and transplanted to pots in the greenhouse; a considerable number of these clones were lost. Bacterial wilt is also present in the plots at Snowdon; it was apparently introduced there in roots brought from Edmonton for breeding purposes (H.W.M.).

The presence of bacterial wilt in eastern Ontario, previously suspected, has now been established. During July, August and September several surveys were made of alfalfa stands in the Ottawa Valley. Over 100 fields were examined in 7 counties, and 56 samples taken for identification. Of these, all but 12 samples yielded C. insidiosum in plate cultures. Although no critical estimate of individual infections was made on this initial survey, it was noted that damage varied according to age of the plants. The disease was not evident in fields under 3 years old, but in stands of 3 years and older, it was estimated that 5-20% or more of the plants were severely affected. In general, stands of alfalfa over 5 years from seeding were greatly reduced in vigour, which was apparent from the large number of plants killed or stunted by the disease.

By the use of Reed's gram-stain technique as developed for the identification of bacterial ring rot of potato, a quick method was available for determining the presence of C. insidiosum in root tissues. Small pieces of discoloured vascular tissue were macerated in 5 cc. sterile water and allowed to stand for 30 min. A loopful of the resulting suspension was then flamed on a clean slide and stained by Reed's method. This technique is simple and permits positive identification in a matter of minutes (R.J. Baylis).

ROOT ROT (Fusarium sp.). Infection was light in a field at Brooks and a trace in one near Lethbridge, Alta. (J.E.J. Thomson).

LEAF SPOT (Leptosphaeria pratensis (Stagonospora Meliloti). Infection in southern Alta. was estimated as 6-tr. 1-sl./87 fields, the disease appearing about mid-July (J.E.J. Thomson). This leaf spot was common in fields about White Fox, Sask.; damage was slight (H.W.M.).

DOWNY MILDEW (Peronospora aestivalis). In a survey of 87 fields in southern Alta. infection was 6-tr. 3-sl., mostly in the Brooks district (M.W.C.).

YELLOW LEAF BLOTCH (Pseudopeziza Jonesii). Infection was estimated to be 27-tr. 16-sl. 1-mod./87 fields in southern Alta. Early in July considerable defoliation was evident in the Brooks district. In the variety plots at the Station, Lethbridge, the variety Buffalo showed the greatest infection (M.W. Cormack). The disease was found in 20 out of 50 fields examined in Sask.; it was late in appearing, much less prevalent than in 1949, and defoliation was much less severe (H.W.M.). Leaves on specimens collected near Forest, Ont., on 16 June bore an abundance of the imperfect stage, Sporonema phacidioides (J.D. Gilpatrick, D.B.O. Savile). A slight infection was present in a field at C.E.F., Ottawa (V.R. Wallen).

COMMON LEAF SPOT (Pseudopeziza Medicaginis) infection was general on Rhizoma in the plots at Point Grey, B.C.; damage was slight (W. Jones). Infection was 13-tr. 11-sl./87 fields in southern Alta., tr.-sl. in the variety plots at Lethbridge (M.W. Cormack); 12-tr. 17-sl. 18-mod. 6-sev./80 fields in the Peace River district and 8-tr. 6-sl./160 fields in central Alta. (J.B. Lebeau, D.A. McTavish). Infection was 12-sl. 25-mod. 3-sev./50 fields in Sask.; it was more prevalent than in previous years. The disease does not appear to cause as much defoliation as black stem or yellow leaf blotch (H.W.M.).

Common leaf spot was, in general, moderate in Ont., and was more prevalent than in 1948. A survey of the plots at O.A.C. and several fields about Guelph in October revealed all plants infected with sl.-mod damage (J.D. Gilpatrick). Moderately affected specimens were received from Ste. Anne de Bellevue and St. Hyacinthe; the disease was apparently more prevalent in the late fall in Que. than usual (I.L.C.). Current year plants of all varieties were heavily infected at Ste. Anne de la Pocatiere. Plants one or more years old carried only a slight infection (A. Payette). Average infection was slight in Queens Co., P.E.I., varying from trace to heavy with some defoliation (R.R. Hurst).

WILT (Sclerotinia Trifoliorum). Damage was rather severe in the nursery rows at Agassiz, B.C. (W. Jones, M. Clarke).

RUST (Uromyces Medicaginis) was generally prevalent in the plots, O.A.C., Guelph, Ont., in September although damage was slight (J.D. Gilpatrick).

WITCHES' BROOM (virus). Infection was 5-tr. 3-sl./240 fields in central Alta. and the Peace River district (J.B. Lebeau). A few affected plants were seen in an old field at Hudson Bay Junction, Sask.

YELLOWS (undetermined virus). A trace was found in 4 fields in York Co., N.B.; for a description of the disease see P.D.S. 28:18 (D.J. MacLeod).

ROOT ROT (cause undetermined) slightly affected 2 fields in the Peace River district, Alta. (J.B. Lebeau, D.A. McTavish).

YELLOWS (boron deficiency). A few plants showing chlorotic foliage were brought to the laboratory from Ste. Rose, Laval Co., Que. The histological abnormalities present were in every way comparable to those observed earlier in other Leguminosae suffering from boron deficiency (A. Payette, R.O. Lachance).

YELLOWS (cause undetermined) was recorded as 11-tr. 4-sl./ 87 fields in southern Alta. (J.E.J. Thomson) and 2-tr. 1-sl. 1-mod/ 240 fields in central Alta. and the Peace River district (J.B. Lebeau, D.A. McTavish). In September the second growth was severely dwarfed and yellowed in most plots at O.A.C., Guelph, Ont. It may have been caused by a mineral deficiency accentuated by the dry weather (J.D. Gilpatrick).

SWEET CLOVER

STEM CANKER (Ascochyta caulicola). Infection was trace to light in 3 stands in southern Alta.; a light infection was also found in roadside stands near Scandia (J.E.J. Thomson).

BLACK STEM (Ascochyta Meliloti). A trace infection was seen in one field in the Peace River district, Alta. (J.B. Lebeau). Black stem was common on sweet clover in sheltered spots in Sask. (H.W. Mead).

PHYTOPHTHORA ROOT ROT (P. Cactorum) caused slight damage in one field near Magrath, Alta. (M.W. Cormack).

ROOT ROT (cause undetermined) caused moderate damage in a field in the Peace River district, Alta. (J.B. Lebeau).

SEEDLING BLIGHT (cause undetermined). Over 70% of the seedlings were destroyed in a large experimental plot at Saskatoon, Sask. Fusarium oxysporum sensu Snyder & Hansen (= F. redolens Wr.) was isolated consistently, but this fungus failed to produce seedling blight in greenhouse tests (H.W.M.).

COMMON CLOVER

WINTER CROWN ROT (low-temperature basidiomycete). Infection was 4-sl. 1-mod. 1-sev./6 fields examined in the Sangudo district, northwest of Edmonton, Alta. (J.B. Lebeau, D.A. McTavish).

SOOTY BLOTCH (Cymadothea Trifolii) moderately affected a small field of alsike clover in the Torch River district, N.E. of Nipawin, Sask. (H.W.M.). Infection was very heavy in the low part of a meadow in Queens Co., P.E.I. (R.R. Hurst).

POWDERY MILDEW (Erysiphe Polygoni) was quite common on both red and alsike clover through much of the semi-arid B.C. Interior (G.E. Woolliams). Infection was sl.-mod. in most roadside stands of red clover in the Brooks district, Alta. (J.E.J. Thomson) and 5-sl. 4-mod. 1-sev./58 fields of red clover in the Peace River district and central Alta. (J.B. Lebeau, D.A. McTavish). In general, powdery mildew was very light on red clover during spring and early summer in Ont., but it was quite prevalent in the fall. All the foliage was affected in the plots at Guelph and in a field at Brampton in Sept.-Oct. (J.D. MacLachlan). Infection was tr.-mod. on red clover at the Station, Charlottetown, P.E.I. (R.R. Hurst).

ANTHRACNOSE (Kabatiella caulivora). Infection was 4-tr. 8-sl. 4-mod./37 fields of red clover in central Alta. and 6-tr. 1-mod./21 examined in the Peace River district (J.B. Lebeau, D.A. McTavish). A moderate infection was also observed in a field of Altaswede at Rimbey (A.W. Henry).

RUST (Uromyces Trifolii) slightly affected roadside stands of white Dutch clover in the Brooks district, Alta. (J.E.J. Thomson). Rust (U. fallens) was general in several plots of red clover at O.A.C., Guelph, Ont., in the early fall, but damage was slight (J.D. Gilpatrick). A few fields of red clover were severely rusted at St. Eugene, L'Islet Co., Que., whereas traces were rarely found on white clover, wild or cultivated, including the variety Ladino. Pycnia and aecia were found along with telia on white clover at St. Roch in November (A. Payette). Infection was a trace to severe, average slight, in a field of red clover at the Station, Charlottetown, P.E.I.; rust was also reported from Prince and King Counties (R.R. Hurst).

SCLEROTINIA WILT (S. Trifoliorum) affected 5-10% of the plants of Ladino white clover in the plots, C.E.F., Ottawa, Ont., in April. Apothecia were abundant in the same plots this fall from 27 Sept. to

10 Nov. when there was a killing frost. It also affected about 2% of the red clover plants in the plots, and 15% of plants in a field of red clover, C.E.F.; in the latter field clover root borer destroyed a further 75% of the plants during the summer. Wilt affected occasional plants of sainfoin (Onobrychis viciaefolia) in the introductory nursery, C.E.F., but no wilt was found in red clover fields elsewhere in the Ottawa district (R.J. Baylis, V.R. Wallen).

MOSAIC (virus) was severe on plants selected from a winter crown rot test at Edmonton, Alta., and held in a greenhouse at Saskatoon, Sask. since 1946 (H.W.M.). A trace of mosaic (Trifolium virus 1) was found in 2 fields of red clover in York Co., N.B. (D.J. MacLeod).

WITCHES' BROOM (?virus) was observed for the second year in a 1/10 acre plot of alsike clover at the Station, Prince George, B.C.; about 15% of the plants were affected. It also affected 25% of the plants of birdsfoot trefoil (Lotus corniculatus) in two 25 foot rows at the Station. Witches' broom was also found affecting at least 10% of the wild lupin plants (Lupinus sp. indet.), which grow on uncultivated land about Prince George. Only 3-4 plants of red clover growing wild were found affected at Quesnel, in the Cariboo district (N.S. Wright).

In some plots of Ladino white clover at the Station, Ste. Anne de la Pocatiere, Que., plants failed to flower, but instead numerous little leaves developed giving the appearance of witches' broom. The same trouble was observed in all stands of Ladino clover over one year old inspected in L'Islet Co. (A. Payette). Five red clover plants showing symptoms resembling witches' broom were found in a field in York Co., N.B. (D.J. MacLeod).

YELLOWS (?virus) affected a trace to 2% of the plants in 3 fields of red clover in York Co., N.B. (cf. P.D.S. 28:21) (D.J. MacLeod).

VETCH

LEAF and POD SPOT (Ascochyta Pisi) caused slight damage to leaves and pods in a field of hairy vetch (Vicia villosa) near Simcoe, Ont., when it was surveyed in early July. The pathogen was isolated and determined by comparison with known cultures of A. Pisi. (J.D. Gilpatrick).

BUCKWHEAT

YELLOWS (Callistephus virus 1) was common and severe on tartarian buckwheat in York, Carleton and Sunbury Counties, N.B. A trace was also found in 2 fields of Silver Hull in the latter county (D.J. MacLeod).

CORN

STALK and EAR ROT (Diplodia Zeae). A trace infection of stalk rot was found in spots in the plots of hybrid corn at the Station, Harrow, Ont.; infection was severe on infected plants and pycnidia were abundant about the nodes. Ear rot was at a very low ebb in Essex and Kent Counties in the fall of 1949, infection being a trace (W.E. McKeen).

BACTERIAL STALK ROT (Erwinia dissolvens (Rosen) Burkh.) affected 10% of the plants causing their death in a planting of one inbred corn in Essex Co., Ont., on 15 July following an extremely hot wet period. Infection took place just above the ground level. Bacterial ooze could be detected and the parenchymatous tissue was completely destroyed (W.E. McKeen).

EAR ROT (Fusarium moniliforme) slightly infected all varieties in southern Ont. in the fall (W.E. McKeen).

SEEDLING BLIGHT, STALK ROT and EAR ROT (Gibberella Zeae (Fusarium graminearum). Seedling blight was severe in low, wet spots in one field of hybrid corn in June in Kent Co., Ont., following a cold period. Gibberella stalk rot was present in every field in southern Ont. this fall and in some fields the yield was reduced by 75%. Some hybrids were more severely affected than others and the disease was present on virgin soil. The roots of infected plants become pink. Such plants are easily pushed over and are frequently lodged. Ear rot, on the other hand, was exceptionally scarce in the area, infection being light and damage negligible (W.E. McKeen).

Perithecia of Gibberella Zeae were collected on overwintered corn stalks at the University farm, Fort Garry, Man., on 2 and 19 Aug. Even on the later date many perithecia were still immature. It appears that ascospore discharge occurs too late in this area to cause appreciable head blight of cereals. Single ascospores taken from the two collections mentioned above yielded only the usual "wild type" cultures of this species (W.L. Gordon).

RUST (Puccinia Sorghi). A trace infection was observed on a field of commercial hybrid corn in Essex Co., Ont. (W.E. McKeen). A slight infection was seen in one field of fodder corn in Kings Co., P.E.I. (R.R. Hurst).

SMUT (Ustilago Maydis). Two reports with specimens were received, one from Wetaskiwin and one from Streamstown, Alta. (A.W. Henry). Abundant tassel infection occurred in field corn at O.A.C., Guelph, Ont. (J.D. MacLachlan). Smut was exceptionally abundant in southern Ont. and caused considerable damage. Infection averaged 15% and reached as high as 50%; average damage was about 2% (W.E. McKeen). Of 11 fields of corn examined in Carleton Co., 4 were affected, infection being tr.-20% (V.R. Wallen).

FLAX

Prof. T.C. Vanterpool, University of Saskatchewan, Saskatoon, Sask., has prepared the following notes, "Flax Diseases in Saskatchewan in 1949".

The acreage sown to flax in 1949 in Sask. was 132,000 acres, or less than one quarter of the previous year's. This acreage, as is usual in the province, was so spread over widely separated areas that a detailed disease survey was not attempted. The following notes are based on trips in central and northeastern sections, and on information on conditions in the southeast supplied by J.A. Paterson, a graduate student well acquainted with flax diseases, who is conducting investigations on hail damage to flax.

The common flax diseases were all encountered, but the damage was generally slight. Few disease enquiries were received from growers. The impression was gained that the absence of large acreages in close proximity prevented a build up of inoculum of any one disease over wide areas. Thus single, isolated fields were found occasionally showing a moderate infection of either rust, browning and stem-break, or pasmo, but the next field, which was usually miles away, would usually present an entirely different disease picture.

RUST (Melampsora Lini) was generally light and damage negligible except in a few instances where flax was sown on flax stubble. In one field rusted Royal again showed a tendency to lodge. (Early spread from rusted stubble "spread" among the plots in the Irrigation Nursery at Saskatoon was poor; a moderate infection developed, but relatively late in the summer, due probably to May and much of June being dry. In the Wilt Nursery, however, where flax follows flax each year on fall-ploughed land and sowing is purposely delayed, the rust infection was moderate and well ahead of its development in the Irrigation Nursery). Field observations revealed infection moderate on pedicels and calyces, with lesser amounts on lower parts of the plants in a field at White Fox on 9 Aug.; slight rust on Redwing, trace on Royal and none on the other licensed varieties in the Line Elevator plots at Pontrilas; virtually no rust on both oil and fibre varieties at the Station, Melfort, and slight amounts on late tillers or plants at Wadena. Stem Canker (Fusarium spp. and Alternaria in association with rust lesions) was conspicuous in one thick stand at Saskatoon, but it occurred in traces only elsewhere. Examination of large samples collected from the plots at Alameda on 18 Sept. revealed light infection on Dakota, light to moderate on Redwing and mod.-sev. on Royal; infection came late and the seed showed no signs of shrivelling.

BROWNING and STEM BREAK (Polyspora Lini). A trace to trace plus was present in the Irrigation Nursery and plots at Saskatoon. Slight browning was also found on volunteer flax plants in a barley field on flax stubble. Moderate (8%) stem break with slight browning was present in a field at Wadena and both browning and stem break were sl.-mod. at Elfros. These fields were in localities where the disease was severe in 1948.

PASMO (Mycosphaerella Linorum (Wr.) Garcia Rada (Septoria linicola) developed late in the Irrigation Nursery at Saskatoon from scattered infected stubble. The disease was first noticed on 3 Aug. and some lines were heavily infected by harvest, though not as severely as in 1948. In mid-August a field of Viking on Viking stubble was heavily infected at Marysburg; infection probably occurred early as the seed was moderately to severely shrunken. On samples from Alameda on 18 Sept. pasmo was sl.-mod. on Dakota, mod. on Redwing and sl. on Royal. Pycnidia were most abundant on Dakota. No shrivelling of the grain was evident.

SEEDLING BLIGHT (mostly Rhizoctonia Solani). Observations, mainly from the flax plots at the Station, Melfort, and at the University, Saskatoon, again revealed damping-off caused by R. Solani to be most severe on land in barley the previous year. The trouble was mod.-sev. in a field sown 14 May following crested wheat grass. Some 8-10% of the seedlings were blighted; 59% of the blighted seedlings yielded R. Solani on culturing. At Melfort, the incidence of post-emergence blight was higher than 1948; 19% of specimens, when cultured, yielded R. Solani (E.J. Hawn, T.C.V.).

LATE ROOT ROT (miscellaneous fungi) was not as common as in 1948. One field at Elfros, which showed a slight amount, yielded mostly Rhizoctonia Solani. Isolations from 100 plants from a field affected with root rot at the University yielded Alternaria spp. 21%, Fusarium spp. 18% and R. Solani 8%. Pythium ultimum was also occasionally present (E.J. Hawn, T.C.V.).

BROWN STEM ROT (Alternaria linicola, etc., not associated with rust lesions). Conspicuous brown, smooth lesions, one to several centimetres in length and usually encircling the stem, were present in moderate amounts in fields nearing maturity at Love and Wadena. Some lesions appeared to originate at the base of the leaves. Stem rot associated with die-back of the tops was found at Delisle. Isolations from plants from these localities yielded A. linicola and A. tenuis. Only an occasional isolate of Fusarium was obtained. For the second year A. linicola has been isolated from brown stem rot lesions. Greenhouse inoculation experiments to date indicate that stem infection of flax by A. linicola rarely occurs until the plants are in the late flowering or boll stage and even then not with any great regularity. It is believed that a slight setback of the plants in the field encourages infection by A. linicola and may be essential. The fungus was found sporulating in dark, slightly roughened lesions on some specimens collected. When plants in the early boll stage were sprayed with spores of A. linicola in field experiments, heavy stem, leaf and boll infections developed whereas infections were few on control plants sprayed with water. Seed size was apparently unaffected. Field inoculation of seed with oat-hull inoculum caused very slight seedling blight under the dry conditions prevailing in the spring. After the late June rains, some slight lesioning appeared on the lower leaves in these plots. A. linicola was found occasionally sporulating in some of these lesions and was readily isolated. No varietal difference has been detected experimentally among the licensed flax varieties.

HEAT CANKER (physiologic). Slight amounts were found at Vonda and Wadena, and in one plot at the University. It appears that the condition of the soil and succulence of the seedlings are important predetermining factors, as no heat canker was detected in the numerous other plots sown about the same time at the University. Samples of the late type of heat canker (swollen base and constriction or break at ground level) were received from Kindersley and Eatonia.

MISCELLANEOUS. Water Blister (unbalanced water relations) common this year on flax stems in many fields where growth was thick or the plants were succulent. The spots are small, raised and watery, giving to the stem a pimpled appearance.

Freckle or Brown Fleck, a stippled, brown spotting on all leaves except the youngest, is frequently encountered on Royal flax in the greenhouse, where it appears to be worst in the spring. It has not been observed in the field. Preliminary experiments indicate that it is found on plants in steam-sterilized soil only. It has been observed on other varieties.

Fused Leaf appeared in July in one experimental plot at Saskatoon, but in all varieties. These leaves were located about halfway up the stem.

The observations of W.E. Sackston were also summarized in a special report, "Flax Diseases in Manitoba in 1949".

Flax acreage in Man. in 1949 was approximately one eighth of the 1948 figure. Temperatures were above average for much of the growing season and precipitation was below normal. The adverse growing conditions resulted in low average yields per acre particularly where seeding was late. In some areas, however, flax yields were reduced proportionately less than those of wheat, and early-seeded flax yielded almost as many bushels per acre as late-seeded wheat.

One survey was made in late July and early August, when late flax was in bloom and early flax was beginning to ripen, and another survey in early September just as flax harvesting was started. Both surveys covered the main flax-growing areas in Man. and extended into southeastern Sask. Forty-four fields were examined in the earlier survey and 34 in the late one.

Diseases generally were not severe on flax in Man. in 1949. Two observations were however, of particular interest. First was the occurrence of rust on Dakota flax in uninoculated plots at Winnipeg and Morden, and in farm fields throughout the province. In no case was the infection heavy. The absence of rust in farm fields of Dakota in Man. in 1948 and the wide distribution of races attacking it in 1949 indicate how rapidly inoculum can build up, and the danger of severe damage in future if weather conditions are favourable. Second was the occurrence of severe loss from wilt in one farm field. The grower had insufficient Dakota seed in the spring and sowed some old, unidentified seed in a 20-acre portion of a field. Almost all the plants of the unknown variety were killed by wilt in July, whereas only traces of wilt occurred in the Dakota. The unknown variety was later identified as Crown.

WILT and ROOT ROT (Fusarium oxysporum f. Lini, Rhizoctonia Solani). Flax wilt killed almost all the plants in 20 acres of Crown flax near Strathclair, Man., but affected only scattered plants of Dakota in the same field. Pure cultures of F. oxysporum f. Lini were isolated from all affected plants plated. The identity of the susceptible variety was established in greenhouse experiments using soil samples from the farm field. Traces of wilt were found in 12 fields, and 2-5% in 2 of the 78 examined. F. oxysporum f. Lini was isolated from two collections, R. Solani from one, Fusarium spp., Alternaria (tenuis type), and miscellaneous fungi from the rest. Nematodes were present in most cultures.

RUST (Melampsora Lini). Estimates of rust infection were based largely on stem area showing telial infection. No rust was found in 20 fields, traces in 37, 1-5% in 10, 10% in 5, and 15-25% in 6 fields. In only 2 or 3 fields did infection approach the severity of rust on Royal in 1948. The flax variety was determined in only a few of the fields examined. Rust was present in 15 fields of Dakota flax, located throughout Manitoba.

STEM ROT (Fusarium spp. and Alternaria spp.). Stem rot was present in 12 of the 24 fields in which rust was seen in the late-season survey. Discoloration spreading from rust telia affected traces of stem area in 4 fields, 5-10% in 5, 20% in 2 and 50% in 1 field. Affected tissues from five localities were plated. Alternaria (tenuis type) was isolated from all tissues, and Fusarium spp. (mostly F. avenaceum and E. Equiseti) from 10 to 20% of the tissues. A. tenuis, but no Fusarium spp., was isolated when apparently clean telial infections were plated. A. linicola was isolated repeatedly from stem rot lesions in 1948, but infrequently in 1949. Repeated attempts to inoculate telial infections on flax stems in the greenhouse with various organisms isolated from stem rot in 1948 indicated that only Fusarium spp. were pathogenic under the conditions of the experiments. These results suggest that the sporadic occurrence of A. linicola in diseased flax tissue may be a result of environmental conditions favourable to it rather than to its pathogenicity. The presence of A. tenuis in clean telial infections as well as in most other lesions on flax and other crops, and its repeated failure to cause infection in inoculation experiments, indicates that in stem rot as in some other diseases it is a saprophytic invader.

PASMO (Septoria linicola). Traces of pasmo, with mature pycnidia on the lesions, were found in 5 flax fields between 4 and 6 Aug. This period is the earliest that the disease has been seen in farm fields in Man., perhaps due to the fact that surveys have not previously been made at just this time. Five of the 34 fields examined late in the season were free of pasmo. There were traces in 11 fields; 1-5% in 6; 10-20% in 7; and 35%, 50%, 60%, and 80% in 1 each. S. linicola was recovered from a small proportion of the lesions when lightly-diseased tissues were plated, but from most of the lesions when samples were plated from heavily-diseased fields. The field with 80% infection was late-seeded Victory, with large quantities of combine

straw from the 1948 flax crop still present throughout the field. With the exception of this one field, it is believed that pasmo caused relatively little reduction in yield in 1949.

BOLL BLIGHT (cause unknown). Only one field examined in the late survey was free of boll blight. There were traces to 10% in 7, 15-25% in 10, 30-40% in 13, and 45-55% in 3 fields. In the three worst fields, grasshoppers had caused much of the damage in two, and pasmo in the third.

MISCELLANEOUS. Seedling Blight was seen in trace amounts in two farm fields, and in plots at Portage la Prairie and Winnipeg. In one farm field, 10% of the plants had been killed as seedlings, but part of the injury may have been caused by heat or drought. Rhizoctonia Solani was the dominant fungus in cultures from blighted seedlings in plots and it developed from several of the specimens collected in farm fields. Traces of Leaf Spots were seen in 7, 10% in 1, and 50% in 2 fields. Alkaline soil and drought were apparently responsible in the last two cases. Isolations from spotted leaves from the 10% field yielded only Alternaria tenuis and miscellaneous fungi. Traces of Heat Canker were seen in 7, and 5-10% in 3 fields. Traces of Top Browning were seen in 5 fields, 10-15% in 4; 30% in 1, and 75% in 1 field. No Stem Break or Browning was recognized.

Other Observations

WILT (Fusarium oxysporum f. Lini) caused mod.-sev. damage in some plots at O.A.C., Guelph (A.A. Wellwood). Wilt affected 10% of plants of Liral Prince in a field at C.E.F., Ottawa, Ont. (V.R. Wallen). A trace occurred in Cirrus at Ste. Anne de la Pocatiere, Que. Flax was sown on new land this year and not in the field on which flax was severely wilted in 1948 (R.O. Lachance).

RUST (Melampsora Lini). A moderate but late infection was observed in the plots at Lethbridge, Alta. (M.N. Grant). A trace was found in one field near Castor (A.W. Henry). A trace to moderate damage occurred in some test plots at Guelph (A.A. Wellwood). A trace was present on Liral at Ste. Anne de la Pocatiere, Que. (R.O. Lachance). Infection was heavy on some phanerogamic collections of Linum Lewisii from Yukon in 1949. It has also been found, from Man. and Ont., on L. Lepagei, a species from the shores of Hudson Bay (D.B.O.S.).

BROWNING (Polyspora Lini). A moderately affected crop was found south of Castor, Alta. (A.W. Henry).

PASMO (Mycosphaerella Linorum). Five plants in the fibre flax breeding plots at Guelph were found affected on 6 Sept. 1948. Each plant bore several lesions completely encircling the stem. The organism was identified by W.E. Sackston. In 1949, infection was fairly heavy on fibre varieties in these plots. Although the disease was widely distributed, some breeding lines were affected much more severely than others. Mature pycnidia were very abundant (A.A. Wellwood).

MANGEL

CROWN GALL (Agrobacterium tumefaciens). One affected root was brought in from Queens Co., P.E.I., for examination (R.R. Hurst).

LEAF SPOT (Cercospora beticola) moderately affected a field of Frontenac in Queens Co., P.E.I. (R.R. Hurst).

BLACK LEG (Phoma Betae) caused considerable damage as a seedling blight in a field crop near Victoria, B.C. (W. Jones).

DORMANCY and CROWN ROT (boron deficiency) were general on steckling roots planted in the field for seed production in the Grand Forks area, B.C. In many fields roots grew so poorly that they were replanted to other crops. Although the fields in which the roots were grown in 1948 had been treated adequately with boric acid and chemical analysis indicated that the roots contained ample boron, it is thought that the roots were suffering from a boron deficiency induced by allowing the fields to dry out in the fall before the roots were lifted. Irrigation water is usually cut off early in September and the fields become dried out before the roots are lifted in late October (G.E. Woolliams). Crown rot affected an occasional root in a field of Frontenac in Queens Co., P.E.I. (R.R. Hurst).

RAPE

SEEDLING BLIGHT and LEAF SPOT (Alternaria Brassicae). A. Brassicae is the only seed-borne pathogen isolated from scores of samples of rape seed produced in Sask. Seed from 12 samples of the 1948 crop was treated with Ceresan; the average germination of the treated seed was increased 11% over the untreated, when the seed was germinated in flats in the greenhouse (T.C. Vanterpool).

SAFFLOWER

RUST (Puccinia Carthami). Infection was sl.-sev. in the variety test plots at Lethbridge, Alta. (M.W. Cormack).

WILT (cause unknown) caused the death of up to 60% of the plants in a test of 15 varieties at Lethbridge, Alta. Several of the strains recently developed in Nebraska were immune or highly resistant in all replicates. An unidentified phycomycete was consistently isolated from the diseased tissues (M.W. Cormack).

SOYBEAN

Most of the observations on diseases of soybeans were supplied by A.A. Hildebrand in his report "Soybean Diseases in Southwestern Ontario in 1949".

This year, soybeans in southwestern Ontario were threatened more seriously by disease than at any time since 1941. POD and STEM BLIGHT (Diaporthe Phaseolorum var. Sojae) was not only of general occurrence on many varieties and selections, but it became epidemic on Hawkeye and Lincoln in sections of Kent Co. In Hawkeye loss of plants in some stands exceeded 50%; in Lincoln, 10%. The presence of perithecia (DAOM 23353) on some of the stems was confirmed by J.W. Groves; the Phomopsis stage was also present (DAOM 23352). The other disease of outstanding importance was BROWN STEM ROT, (Cephalosporium gregatum), to which Hawkeye was also especially susceptible, the disease having been observed in many fields of the variety in Kent and Essex Counties and on specimens of diseased plants submitted from Pelee Island. Of 9 commonly-grown, commercial varieties under test in the Laboratory disease garden, all showed virtually complete susceptibility to the disease.

Cross-sectional surveys of Kent and Essex Counties revealed that soybeans in general were exhibiting symptoms of MANGANESE DEFICIENCY in varying degrees of severity. In some fields where the plants were severely affected, quality of seed was impaired and yield was reduced. Quick response to manganese sulphate sprays confirmed diagnoses based on foliar symptoms.

Other diseases of sporadic occurrence noted in the course of the surveys included: MOSAIC (Soja virus 1); BUD BLIGHT (virus of tobacco ring-spot group); DOWNY MILDEW (Peronospora manshurica); BROWN SPOT (Septoria Glycines); BACTERIAL BLIGHT (Pseudomonas glycinea); FUSARIUM BLIGHT (F. oxysporum f. tracheiphilum); and SUN SCALD (non-parasitic).

Other Observations

DOWNY MILDEW (Peronospora manshurica). Infection was heavy on 30 Aug. on 2 acres of Pagoda and light on an acre of Capitol growing adjacent to each other in the Cloverdale district, B.C.; the damage was sl.-mod. (I.C. MacSwan). Downy mildew was less prevalent in the O.A.C. plots, Guelph, Ont., than in previous years. All the leaves of Capitol were infected, but the damage was only moderate. Oospores were present in great abundance in the diseased leaves in September. Other varieties were free of mildew (J.D. MacLachlan). A 10% of infection was noted on Capitol near London during an extensive tour of soybean fields in western Ont. in August (F. Dimmock). A moderate infection was present on 28 Aug. on leaves of Pagoda, Capitol and A.K. Harrow in the plots at Ottawa, Ont. (Mary C. Elliott).

SUGAR BEET

LEAF SPOT (Cercospora beticola) was more prevalent than usual on sugar beets and mangels in Ont.; infection was moderate on susceptible varieties (J.D. MacLachlan).

BLACK ROOT (various fungi) was prevalent in the sugar beet growing areas of southern Alta. The damage was estimated as 6-tr. 17-sl. 7-mod. 1-sev./33 fields examined. It was also apparently responsible for at least part of the damage in several fields ploughed up prior to examination although some injury was probably caused by excess soil moisture and possibly by soil deficiencies. Phoma Betae, apparently seed-borne, occurred most commonly among the isolates from diseased seedlings (M.W. Cormack).

Black root, though present as usual this year in the sugar beet fields of southwestern Ont., did not attract as much attention as in certain past seasons, for two reasons. In the first place, the number of infected fields did not increase in proportion to the greatly-increased acreage for 1949. In the second place, areas of infection were smaller and more localized than usual. However, where the disease did occur, destruction of stands was as complete and losses were as severe as in previous years (A.A. Hildebrand).

ROOT ROT (various fungi) occurred mainly in patches in sugar beet fields in southern Alta. The damage was estimated to be 3-tr. 12-sl. 9-mod. 3-sev./38 fields examined shortly before harvest. In November over 5000 beets were examined during the removal of storage piles. A total of 5.4% were infected, and 1.9% were severely rotted. There was little evidence of spread of infection during storage, but the degree of rotting was consistently higher in some piles than in others. Phoma Betae, Aphanomyces, Pythium, Rhizoctonia, and Fusarium spp. were isolated from the several distinct types of rot found in the field and in storage (M.W. Cormack).

SUNFLOWER

Observations in Man. were the subject of a special report, "Sunflower Diseases in Manitoba in 1949" by W.E. Sackston.

The acreage sown to sunflowers in Manitoba increased from 28,000 in 1948 to more than 50,000 in 1949. The increase resulted from more intensive planting in the main sunflower area between Morden and Rosenfeld and from its extension westward and northward. High temperatures and low precipitation depressed yields per acre, but the latter helped to retard the development of foliage diseases. Disease surveys were made when the plants were in bloom in mid-August and as the crop was ripening in mid-September. W.A. Russell, Dominion Experimental Station, Morden, and Eric Putt, Co-operative Vegetable Oils, Ltd., Altona, assisted for part of each survey.

RUST (Puccinia Helianthi) was present in all but one of the commercial fields examined. Rust was a trace in 19 fields, 1-5% in 19, 10-25% in 16, and 50-80% in 6. These estimates are based on average infection on the Advance hybrid plants in each field. Infection was again heavier on the inbred female parent S37-388 than on Sunrise or the Advance hybrid, but, apparently because of the weather conditions, rust caused less damage on S37-388 than in 1948. Although Advance rusted less heavily than S37-388, infection of Advance was much heavier than in 1948, suggesting that there may have been some change in the pathogenicity of the rust. Heaviest infections were found in the centre of the sunflower area. They became progressively lighter with increasing distance north of Rosenfeld and west of Morden. Rust was scarce in a large planting near Clearwater, and only traces were found in fields in the MacGregor-Portage la Prairie area. Development of rust was followed in the crossing blocks throughout the season by T. Johnson. The first pycnia were found on cotyledons of volunteer seedlings 7 June and the first aecium 8 June. Pycnia were numerous and aecia were starting to open on volunteer seedlings 16 June and a few pycnia were present on cotyledons of the current crop. The first uredinial pustules, newly erupted, were found 5 July. Uredinial infections ranged as high as 80% in plots at Morden on 15 August. Rust was most severe later in the season in commercial plantings, in which the earliest infections were found. Traces of rust were found on Helianthus Maximiliani in a few localities in August and it became general and severe in some colonies in September.

WILT (Sclerotinia Sclerotiorum). Thirteen fields were free of wilt; infection was tr.-1% in 40 fields, 5-10% in 2, and 25% in 1. Wilted plants occurred singly and in patches. The field with 25% wilt was seeded to sunflowers in 1947, but the crop was plowed down in the seedling stage and the field reseeded to corn, which was used for hog pasture, then ploughed down late in the fall. Part of the field was fallowed and part seeded to wheat in 1948. Wilt was heavier in the fallowed area, where growth was more vigorous.

LEAF MOTTLE (cause unknown), first observed in 1948 (P.D.S. 28:32), was present in 19 of 61 fields examined in 1949. It was observed particularly during the August survey before the leaves dried out. Mottle was a trace in 15 fields, 1% in 2, 5% in 1, and 50% in 1. The last field was on sandy soil north of MacGregor. Mottling in this case was associated with bronzing of the leaves and seemed to be caused by nutritional or environmental factors. The field with 5% mottle, near Morden, had been seeded to sunflowers in 1946 and 1947, and to oats in 1948. The affected plants occurred singly or, more frequently, in patches, mostly with a few plants or in some cases extending up to 30 feet along the row and involving three or four adjacent rows. In several fields some of the mottled plants were affected by Sclerotinia wilt. Brown discoloration of vascular bundles was observed in most of the mottled plants examined.

PREMATURE RIPENING and STALK ROT (cause unknown). Premature ripening was conspicuous in many fields in mid-September; it was found in 8 of 13 fields examined during the late survey. Affected plants were trace in 1 field, 5-10% in 4, 11-20% in 2, and 60% in 1. Premature ripening may have been induced by various causes in the respective fields, but certain characteristics were observed on all affected plants. The heads were always flaccid, whereas the heads of normally ripened plants were firm. All affected plants were infested by stalk borers, and in most cases extensive discoloration and rotting of the internal stem tissues spread from the borer tunnels. Healthy stems also were infested by borers, but there was no internal decay in such stems, and discoloration was confined largely to frass in the borer tunnels. In some fields prematurely ripe plants were appreciably shorter than nearby healthy plants, but in others this difference was not pronounced. Affected plants usually occurred in patches. In some cases such patches appeared to be on low areas in the field. In one such patch there was a visible accumulation of salts just below the soil surface. Ten per cent of the plants were prematurely ripe in the field near Morden in which 5% leaf mottling was found in August. Affected plants showed a distinct mottling of the stems. The discoloration apparently started as dark areas on the stem at the base of leaf petioles, spreading from there until adjacent discolored areas coalesced, in many cases involving the whole stem. The vascular cylinder of such stems was a dark green, the color extending almost to the epidermis. The pith was separate from the outer tissues in many affected plants, and in some of them was black. Affected stems were weak and brittle. Among the organisms isolated from various tissues of plants prematurely ripe and showing stalk rot were A. tenuis, A. cucumerina (identified by J.E. Machacek), Fusarium spp., Verticillium albo-atrum, and bacteria.

MISCELLANEOUS. Stunt (cause unknown) seen in 1948 (P.D.S. 28:33), resembling systemic infection with downy mildew, was found on several plants in plots at Altona, but was not recognized in farm fields. Dwarfed plants were numerous in one field, but their leaves were not chlorotic or rugose. Neck Rot (decay of the lower surface of the head and adjacent stem tissues) was present on one or two plants in a few fields. Cultures of Rhizopus nigricans, A. tenuis, and Fusarium spp. were isolated from diseased tissues. None of the organisms caused rotting when inoculated into sunflower heads in the field early in September, but cultures of R. nigricans and Fusarium were reisolated from the inoculated tissues a month later. Frost on 6 June killed the growing points of plants in three of the fields examined, causing the production of numerous stems from adventitious buds. In one field 50% of the plants bore 3-6 flowering stems. Severe injury from 2,4-D was seen in one field next to a grain crop which had been treated with a volatile form of the chemical. Traces of 2,4-D injury were seen in two other fields. Downy Mildew (Plasmopara Halstedii) was found on one volunteer seedling from the 1948 crop and on several seedlings in plots at Morden. It was present on two plants of Helianthus Maximiliani near Strathclair on 2 Sept. Powdery Mildew (Erysiphe Cichoracearum) developed late in the season in plots at Winnipeg and Morden and traces were seen in farm fields. Septoria Leaf Spot (S. Helianthi) was not found.

Other Observations

POWDERY MILDEW (Erysiphe Cichoracearum) and RUST (Puccinia Helianthi) were generally prevalent, but damage was slight, in the plots, O.A.C., Guelph, Ont., in September (J.D. MacLachlan).

WILT (Sclerotinia sclerotiorum). Affected specimens were received from Kamsack, Sask. (T.C. Vanterpool). Wilt caused moderate damage to a small planting at Yorkton (H.W.M.).

CULTIVATED GRASSES

AGROPYRON - Wheat Grass

Powdery Mildew (Erysiphe graminis) was common on A. repens at Agassiz, B.C., on 8 Aug. (W. Jones).

Smut (Ustilago bullata) was severe in one field of A. trachycaulum at Parkside, Sask. (H.W.M.).

BROMUS - Brome Grass

Ergot (Claviceps purpurea). Infection was tr.-sl. in roadside stands of brome grass in the Pincher Creek district, Alta. (J.E.J. Thomson).

Leaf Spot (Selenophoma bromigena). A light infection was found in one field of brome grass at Claresholm, Alta. (M.N. Cormack). Infection was general and moderate in a large seed-producing area of B. inermis at Unity, Sask. (H.W.M.).

DACTYLIS GLOMERATA - Orchard Grass

Bacterial Blight (Corynebacterium rathayi) was much more inconspicuous than in the other years, since it was first observed in 1946, at Ste. Anne de la Pocatiere, Que.; damage was slight (A. Payette).

Purple Leaf Spot (Mastigosporium rubricosum) was common and the fungus was sporulating freely on young foliage in April at North Saanich, B.C. (W. Jones).

Brown Stripe (Scoletotrichum graminis) was also common at North Saanich, B.C. (W. Jones).

FESTUCA - Fescue

Root Rot (Fusarium sp.). A trace infection was observed in one field of creeping red fescue at Beaverlodge, Alta. (J.B. Lebeau).

PHLEUM PRATENSE - Timothy

Ergot (Claviceps purpurea) was observed frequently in Queens and Kings Counties, P.E.I. (R.R. Hurst).

Stem Rust (Puccinia graminis var. Phlei-pratensis). A single plant was severely rusted in a patch of timothy at Comox, B.C.; the other plants were not infected (A.M. Brown). Infection reached a maximum of 50% in a field of Climax timothy on 21 July in Carleton Co., Ont. (V.R. Wallen). A heavy infection was present in a field of timothy in Queens Co., P.E.I. (R.R. Hurst).

LAWNS and TURF

Snow Mould (Fusarium sp.). A severe infection was observed in 2 bowling greens and one lawn about Victoria, B.C., in November (W.R. Foster).

Fairy Rings (Marasmius oreades) are widely distributed on lawns on the B.C. coast; they appear hard to eradicate (W.R. Foster).

Brown Patch (Rhizoctonia, etc.) lightly affected lawns in Charlottetown, P.E.I. Treatment with Semesan has given satisfactory control (D. Robinson).

A slimy green growth developed over 600 sq. ft. of a lawn in Edmonton, Alta., during a 3-week rainy period in July. The growth seemed to erupt from the soil in irregular patches. R.C.H. Cormack, Department of Botany, University of Alberta, identified the alga present as a species of Nostoc (T.R.D.).

III. DISEASES OF VEGETABLE AND FIELD CROPS

ASPARAGUS

SEEDLING BLIGHT (Fusarium oxysporum) was observed for the first time in Canada in the Niagara Peninsula, Ont., in 1945, when it destroyed two plantings and greatly weakened most of the plants in a third. It was not seen again until the spring of 1949, when three fresh outbreaks occurred in the Peninsula. The disease appears to be most severe on land previously occupied by mature asparagus even up to 10 years after the plants were destroyed and the land used for other crops. Symptoms of the disease are most evident in seedling plants, 2-6 weeks old. Affected plants are stunted, yellowed or wilted. Wilting seems associated with complete collapse of sections of the primary root. The causal organism, F. oxysporum, has been isolated consistently from soils, from mature plantations, and from land cropped previously to asparagus. The pathogen appears to be favoured by cool soil temperatures (K.M. Graham).

YELLOWS (virus). Two plants severely affected by what appeared to be yellows were observed at Lacombe, Alta. (D.J. McLeod).

BEAN

GREY MOULD (Botrytis cinerea) was common on the pods of Blue Lake pole bean and Pencil Pod Wax at Milner and Saanichton, B.C., in September (W. Jones). It caused tr.-sl. infection as localized leaf lesions from fallen petals and rot of pods at the flower end on bush beans in the Lower Fraser Valley and about Vancouver (H.N.W. Toms). About 4% of the plants were severely damaged in a crowded planting of Bountiful in Queens Co., P.E.I. (R.R. Hurst).

ANTHRACNOSE (Colletotrichum Lindemuthianum). Light infection in plots at Lacombe, Alta. (T.R.D.). Not as prevalent in Ont. as in 1948; infection tr.-mod. in vegetable gardens about Guelph and tr. in 11 varieties in the O.A.C. plots, but severe in plots artificially inoculated (J.D. MacLachlan, J.D. Gilpatrick). Infection trace in 2 of 27 fields examined in the Port Hope area (A.J. Skolko, M.D. Sutton). Observed in a few fields in the Montreal district, Que., but damage very slight even in fields sown with infected seed, due to dry conditions this year (E. Lavallee). Trace infection in a garden plot of Black Seeded Pencil Pod at Kentville, N.S. (K.A. Harrison). Every pod of Improved Golden Wax severely injured in a garden in Queens Co., P.E.I. (R.R. Hurst).

POWDERY MILDEW (Erysiphe Polygoni). Trace on Vermont Cranberry in the plots, O.A.C., Guelph, Ont. (J.D. MacLachlan).

STEM CANKER (Pellicularia filamentosa (Rhizoctonia Solani). A severe infection in a field of Michelite was seen 24 June in Kent Co., Ont. (A.A. Hildebrand).

HALO BLIGHT (Pseudomonas phaseolicola) appeared 16 June on Landreth's strain of Stringless Green Pod and considerable spread occurred in the next 2 weeks in the seed testing plots, Point Grey, B.C. (H.N.W. Toms). In most fields in which the disease was found in the B.C. Interior, less than 1% of the plants was affected, but in one field of several acres blight developed on 90% of the plants following irrigation by sprinkling (G.E. Woolliams). Infection was tr. at Beaverlodge, Alta., sl. at Edmonton and sl.-mod. at Lacombe (T.R.D.); sl.-sev. in 3 fields of canning beans at Taber and plots at Lethbridge, and absent or tr. in most varieties of field beans (M.W. Cormack). Trace on Supergreen in the plots, O.A.C., Guelph, Ont., on 25 July (J.D. MacLachlan). Trace on Stringless Green pod in a planting in Queens Co., P.E.I. (R.R. Hurst).

SCLEROTINIA ROT (S. Sclerotiorum). Commonly found in both seed and canning crops of bush and pole beans at Vernon, Kelowna, Salmon Arm and Armstrong, B.C.; most serious in pole beans where 90% of the plants were sometimes affected (G.E. Woolliams).

RUST (Uromyces appendiculatus). Light general infection of Blue Lake pole bean in home garden at Chilliwack, B.C. (R.E. Fitzpatrick). Rust was found in a field of Kentucky Wonder pole beans being grown for seed at Winfield. The plants were allowed to spread over the ground and were irrigated by sprinkling. Infection was mainly on the leaves, but some pods were also affected. Rust has not previously been reported from the Okanagan (G.E. Woolliams). Infection tr.-mod. in the plots, O.A.C., Guelph, Ont., in August and September (J.D. MacLachlan). A trace was recorded in Queens Co., P.E.I. (R.R. Hurst).

COMMON BLIGHT (Xanthomonas phaseoli). Trace infection in 3 fields out of 27 examined in the Port Hope area, Ont. (A.J. Skolko, M.D. Sutton). Caused slight damage in gardens about Guelph; pathogen isolated from samples from Freeman and Brantford (J.D. MacLachlan, E.H. Garrard). The disease affected 15% of the pods in a field of Clipper, 20% in one of Corvette and 2% in an acre plot of Pacer in Carleton Co. (V.R. Wallen). Traces only found in a few fields in Laval Co., Que. (E. Lavallee) and in Queens Co., P.E.I. (R.R. Hurst).

BACTERIAL BLIGHT (Xanthomonas phaseoli and Pseudomonas phaseolicola). Numerous cases were observed in Sask.; the disease caused considerable damage (H.W.M.).

CURLY TOP (virus) was fairly widespread in the southern part of the B.C. Interior; infection varied from a trace to 25% depending on the variety and location (G.E. Woolliams).

MOSAIC (virus) infected over 75% of the plants in some 40 acres of Blue Lake, hybrid 65, at Bradner, B.C., but appeared to cause no loss in yield. The seed was imported from California by the canners. Infection was about 30% in 3 acres of a different strain at Langley (R.E. Fitzpatrick, I.C. MacSwan). Less than 1% of the crops being grown for seed in the B.C. Interior were affected by mosaic (Phaseolus virus 1) (G.E. Woolliams).

Mosaic infection in the 27 fields inspected in the Port Hope area, Ont., ranged from less than 1% to 75% and averaged 11% (A.J. Skolko, M.D. Sutton); in the Horticultural plots, O.A.C., Guelph, it was nil on Rival and Logan, tr. in Commodore Improved, and sl.-sev. in 11 other varieties (J.D. MacLachlan); it ranged from 5% in Round Pod Kidney Wax to 60% in Stringless Green Pod in 4 varieties examined in Carleton Co. (V.R. Wallen). Mosaic (Phaseolus virus 1) affected 6 plants of White Marrowfat in a farm garden in York Co., N.B. (D.J. MacLeod). A few plants of Round Pod Kidney Wax were affected in a garden in Queens Co., P.E.I. (R.R. Hurst).

YELLOW MOSAIC (Phaseolus virus 2) was found in a number of fields of beans being grown for seed in the B.C. Interior; infection ranged tr.-10% (G.E. Woolliams). A trace was found in Kentucky Wonder in a garden in Fredericton, N.B. The source of the virus was a planting of gladioli 12 feet from the beans. The gladioli showed a faint mottling of the leaves (D.J. MacLeod).

CHEMICAL INJURY (2,4,5-T) was suffered by bush beans in a home garden at Steveston, B.C., from drifting of spray applied to the side of a public highway. Growth ceased, stems became twisted and flowers failed to produce pods (N.S. Wright).

BEET

LEAF SPOT (Cercospora beticola). General on seed crop of Flat Egyptian at the Farm, Agassiz, B.C.; damage mod. on a few plants (W. Jones). Infection mod. on Detroit Dark Red in a garden in Queens Co., P.E.I. (R.R. Hurst).

DOWNY MILDEW (Peronospora Schachtii). Only a trace found in the Grand Forks district, B.C., on Detroit Dark Red #16 in Oct. (G.E. Woolliams).

SCAB (Streptomyces scabies). Affected specimens received from a gardener at Nanaimo, B.C. (W.R. Foster). Trace on Detroit Dark Red and Crimson Globe in a garden in Queens Co., P.E.I. (R.R. Hurst).

RUST (Uromyces Betae). Infection general and damage moderate to foliage of Detroit Dark Red seed plants at the Station, Saanichton, B.C. on 15 Nov. (W. Jones).

BROWN HEART (boron deficiency). Specimens brought to the Laboratory from only one planting in Queens Co., P.E.I. (R.R. Hurst).

BROAD BEAN

MOSAIC (virus) affected 2 plants in 100 ft. row of broad beans in a garden in Queens Co., P.E.I. (R.R. Hurst).

CABBAGE

BLACK LEAF SPOT (Alternaria brassicicola). A trace on seed plants of Danish Ballhead in the University plots, Vancouver, B.C. (H.N.W. Toms).

GREY MOULD ROT (Botrytis cinerea) severely affected 2% of the heads in a rather damp storage in Queens Co., P.E.I., in March 1949 (R.R. Hurst).

SOFT ROT (Erwinia carotovora) severely affected 5% of the heads of Danish Ballhead in one storage in Queens Co., P.E.I.; the heads had been severely chilled (R.R. Hurst).

DOWNY MILDEW (Peronospora Brassicae). Trace infection on leaves of a Danish Ballhead seed crop in the University plots, Vancouver, B.C. (H.N.W. Toms). Heavy infection on the outer leaves of a 4-acre planting of the same variety on Lulu Island (I.C. MacSwan).

CLUB ROOT (Plasmodiophora Brassicae) affected a few young plants in a truck garden at Royal Oak, B.C. (W. Jones). The club-root situation on cabbage and cauliflower was about the same as last year in the Fraser River Valley (I.C. MacSwan). Infection was general on cabbage and cauliflower on Jesus Island, Que.; due to the drought, diseased plants wilted more and losses were greater than usual (E. Lavallee). A light infection was observed in Queens Co., and the disease was reported from O'Leary, Prince Co., P.E.I. (R.R. Hurst).

WIRE STEM (Rhizoctonia Solani). One grower in Leamington, Ont., brought to the Laboratory several flats of young plants in which 50% of the seedlings were destroyed; losses up to 10% are common in commercial greenhouses in the area (C.D. McKeen). Wire stem was prevalent again in beds and greenhouses in Laval Co., Que. When it was present, most plants were affected and losses heavy. Arasan, applied at the rate of 1.5 gm. per sq. ft. well mixed into the soil, again gave very satisfactory results (E. Lavallee).

FASCIATION (cause unknown). One plant affected in a home garden at Comox, B.C. (I.C. MacSwan).

OEDEMA (non-parasitic). A few plants affected in a garden in Queens Co., P.E.I. (R.R. Hurst).

CARROT

BLACK ROT (Alternaria radicina) caused damage to stored roots and to stecklings planted in the field for seed in the B.C. Interior; it caused severe reductions in stand in some fields and almost no damage in others (G.E. Woolliams).

SOFT ROT (Erwinia carotovora) caused some damage to over-wintered roots in the interior of B.C. (G.E. Woolliams). About 5% of the Chantenay plants were affected in a ½-acre seed crop in Carleton Co., Ont. (V.R. Wallen).

ROOT KNOT (Heterodera marioni). One ½-acre field found affected at St. Martin, Laval Co., Que. (E. Lavallee).

RHIZOCTONIA (Pellicularia filamentosa (R. Solani) affected about 5% of the roots in a garden near Guelph, Ont., but damage was slight; potatoes in the same garden were also affected (J.D. MacLachlan).

VIOLET ROOT ROT (Rhizoctonia Crocorum). An affected root received from Outlook, Sask., showed a superficial film of mycelium and young sclerotia; the correspondent reported that many carrots from his garden showed the thin purplish web characteristic of the disease. (R.J. Ledingham). The disease was first recorded in carrot in Alta. (P.D.S. 17:37-38), but there is a bottled specimen in the Herbarium collected at Fenton, Sask., 27 Sept. 1916, det. H.T. Gussow (I.L.C.).

Affected roots were brought in by inspectors of the Fruit Branch, Toronto, from the Thedford Marsh, Lambton Co., Ont. According to their reports the disease is present in every field throughout the marsh. Some 1-5% of the carrots are affected in patches of a few square feet to 1/4 acre. Violet root rot appears to have been present for some time, but never previously has it caused any alarm. Affected carrots are regularly ploughed down (J.D. MacLachlan). A visit was made to the marsh when harvesting was well advanced. Violet root rot was found in two areas on the properties of four growers. At the southwest end of the marsh carrots and potatoes were affected on one property and carrots on an adjacent holding. Both growers stated that the disease had been noted on carrots each year for the past six years, when the land was again brought under cultivation after being idle. The other location was at the north-east corner of the bog. The disease occurred in a low, apparently poorly drained strip in an area not previously cultivated. The disease is therefore indigenous. In this strip 5-10% of the carrots were affected. No other crops were found diseased (K.M. Graham). First report from Ont. (I.L.C.).

SCLEROTINIA ROT (S. sclerotiorum). Trace infection observed at Edmonton, Alta. (T.R.D.).

BACTERIAL BLIGHT (Xanthomonas carotae) slightly infected seed crops in B.C. Interior (G.E. Woolliams).

DWARF (undetermined virus) was again found in fields in York, Sunbury, and Queens Counties, N.B.; infection ranged from a trace to 5% (D.J. MacLeod).

YELLOWS (Callistephus virus 1) was found only to a slight extent on root crops in the B.C. Interior (G.E. Woolliams). Moderate infection in the plots at Edmonton, Alta. (T.R.D.) and at Yorkton, Sask. (H.W.M.).

About 5% of the plants were affected in a ½ acre seed crop of Chantenay in Carleton Co., Ont. (V.R. Wallen). Yellows was general on carrots in York, Sunbury, Carleton and Queens Counties, N.B.; infection was tr.-47% and averaged 7% (D.J. MacLeod). Yellows affected 20% of the plants in an early-planted field by 1 Sept. Most late-planted fields showed less than 10% by 15 Oct. (J.F. Hockey). The disease was widespread in P.E.I. in 1949; in a planting of Nantes Half Long, 75% of the plants were affected (R.R. Hurst).

CHEMICAL INJURY (2,4,5-T) was present on carrots in a private garden as a result of winddrift from spraying the road allowance at Steveston, Lulu Island, B.C.; protuberences appeared on the main tap root and laterals and plants ceased to grow (N.S. Wright).

CAULIFLOWER

SOFT ROT (Erwinia carotovora). Light infection of the curds in 2 seed crops at White Rock and Elk Lake, B.C. (W. Jones). Affected 10% of the plants in the University plots, Vancouver (H.N.W. Toms).

DOWNY MILDEW (Peronospora Brassicae). Light infection on seed plants of Snowball at the Station, Saanichton, B.C. Oospores were prevalent in a few of the affected seed pods (W. Jones).

CLUB ROOT (Plasmodiophora Brassicae) was common on young plants in a truck garden at West Saanich, B.C. (W. Jones). A few affected plants were seen in the University testing plots, Vancouver and at White Rock (H.N.W. Toms). A large patch severely affected and plants dying in a field in Wentworth Co., Ont., on 25 July; soil is acid in the district (J.D. MacLachlan). Trace infection seen in a planting in Queens Co., P.E.I. (R.R. Hurst).

WIRE STEM (Rhizoctonia Solani) was present in flats of transplants in many greenhouses at Leamington, Ont.; losses varied, but amounted to 15% in some (C.D. McKeen).

SCLEROTINIA WILT (S. sclerotiorum). A few plants killed in a seed crop at Elk Lake, B.C. (W. Jones).

BROWNING (boron deficiency) affected an occasional head in a planting in Queens Co., P.E.I. (R.R. Hurst).

WHIPTAIL (physiological). A mod.-severely affected planting was observed near Victoria, B.C. An application of sodium molybdate the 4th week in May, over 2 months after setting out of the plants, was too late to be of value for the seed crop, but it had a favourable effect in checking and overcoming the trouble (W.R. Foster). According to J.C. Walker (U.S.D.A. Farmers' Bull. 1439, revised 1948), whiptail is a malnutrional disorder occurring chiefly in the U.S. along the Atlantic seaboard on highly acid soils. It has been reported previously in Canada not only in N.B. and N.S., but also in Ont. and Que. (P.D.S. 18, 19, 21, and 28).

Molybdenum deficient soils have been known for some time in New Zealand and Australia. Recently R.B. Walker (Science 108:473-475. 29 Oct. 1948) has demonstrated that molybdenum deficiency occurs in certain serpentine barren soils in California. Soils deficient in molybdenum have not yet been recognized in Canada, but molybdenum unlike most elements is less available in acid than in alkaline soils. That whiptail was due to molybdenum deficiency was first suggested by E.B. Davies (Nature 156:393. 29 Sept. 1945) and confirmed by K.J. Mitchell (N.Z. Jour. Sci. & Tech. 27, sec. H:287-293. 1945) in New Zealand and E.J. Waring et al. (Jour. Aust. Inst. Agric. Sci. 13:187-188. 1947) in Australia. Good control was obtained with ammonium molybdate, 20 lb. per acre, applied in bands along the planting row one week before setting out well-grown seedlings. One ton of bone and blood manure per acre greatly reduced the disease (I.L.C.).

CELERY

EARLY BLIGHT (Cercospora Apii) was found in a small planting near Harrow, Ont., in late May; sprays containing fixed copper were applied soon after the disease appeared and damage was slight (C.D. McKeen). Two fields were found moderately affected at St. Martin, Laval Co., Que. (E. Lavallee).

LATE BLIGHT (Septoria Apii-graveolentis) was rather heavy on the outer, older leaves in the test plots, University, Vancouver, B.C. (H.N.W. Toms). Although late blight was present in most celery fields in the Montreal district, Que., it caused much less damage than usual due to the dry conditions (E. Lavallee). Only a trace of late blight was observed in Queens Co., P.E.I., this year (R.R. Hurst).

YELLOWS (Callistephus virus 1, western strain). About 6% of the plants were severely affected in a field in Sunbury Co., N.B. (Celery and zinnia are highly resistant to the eastern strain of the virus) (D.J. MacLeod).

STEM CRACKING (boron deficiency). A sample of celery received from Holland Landing, Ont., showed cracking at the top of the stalks. The condition developed late in the season after a period of very rapid growth. No organism was isolated from the lesions (C.D. McKeen).

CHIVES

RUST (Puccinia Porri). Specimens showing both uredinia and telia of this rust were collected by Dr. H.T. Gussow in his garden at Victoria, B.C., on 6 Oct. and sent to Ottawa (I.L. Conners, J.A. Parmelee).

CUCUMBER

GREY MOULD (Botrytis cinerea) appeared in several greenhouses in April-May in Essex Co., Ont., and caused up to 10% loss in some crops. Periodic spraying with Fermate prevents outbreaks and rapidly developing lesions have been arrested by painting affected areas with a thick slurry of Fermate (C.D. McKeen).

SCAB (Cladosporium cucumerinum) was present, as usual, in many cucumber crops, both in greenhouse and field, in Essex Co., Ont.; the damage was slight (C.D. McKeen). One lot of 200 beds was severely affected at St. Laurent, Jacques Cartier Co., Que.; 75% of the crop was destroyed, a loss of $4000-$5000. Beds had been set on the same spot for many years and no fungicide was applied until the disease became severe (E. Lavallee). Scab was found after harvest at Ste. Anne de la Pocatiere when cucumber seed was being collected from ripe fruit (A. Payette). Scab was general on cucumbers about Charlottetown, P.E.I., and moderate losses were reported by growers. Infection occurred on the fruits at all stages of development (D.B. Robinson).

BACTERIAL WILT (Erwinia tracheiphila). Traces were observed in several field crops in Essex Co., Ont., and it destroyed 3% of the plants in one greenhouse at Leamington (C.D. McKeen). Diseased specimens were received from Wallaceburg, Watford, Weston, and Clarkson (J.D. MacLachlan). A few cases of bacterial wilt were observed in the Montreal district, Que., but the disease is probably quite widespread (E. Lavallee). Light infection seen on several varieties in the test plots at Ste. Anne de la Pocatiere, (R.O. Lachance).

POWDERY MILDEW (Erysiphe Cichoracearum) developed in a few fields in Essex Co., Ont., near the end of the harvesting period. It also appeared late in the spring in many greenhouse crops. The disease is always prevalent in greenhouse cucumbers grown in the late fall and makes the growing of this crop hazardous (C.D. McKeen).

WILT (Fusarium sp.). Several plants were killed in a garden at Lethbridge, Alta.; isolations yielded a Fusarium resembling F. oxysporum (M.W. Cormack).

FOOT ROT (?Fusarium). As in the past few years, foot rot was found in many greenhouse crops in the Leamington district, Ont. Lesions appear on the underground internode. Species of Fusarium have always been isolated, but none of those tested have proved pathogenic (C.D. McKeen).

WILT (Mycosphaerella citrulina). Traces found in 4 greenhouses at Leamington, Ont. The disease usually develops near the end of the harvesting season; fruit bodies of the fungus always appear on the stem near a node (C.D. McKeen).

DOWNY MILDEW (Pseudoperonospora cubensis) was observed in south-western Ont. attacking greenhouse and field crops in late September. The

disease threatened to destroy the fall greenhouse crop, but it slowly disappeared after heating of houses began. Little damage resulted in either field or greenhouse (C.D. McKeen).

ANGULAR LEAF SPOT (Pseudomonas lachrymans) was seen in 2 greenhouse crops at Leamington, Ont. Little damage was done as the disease developed at the end of the cropping period (C.D. McKeen).

DAMPING OFF (Pythium ultimum). Up to 7% of some greenhouse stands were destroyed in commercial houses by damping-off in Essex Co., Ont. Plants set in the greenhouse have been destroyed up to 10 days after transplanting. Pythium ultimum was isolated from several affected plants and proved highly pathogenic to cucumbers up to at least 6 days after transplanting if the inoculum was applied near the hypocotyl (C.D. McKeen). Damping-off (P. sp.) destroyed 50% of the plants in a field in Queens Co., P.E.I., and other fields less severely affected were reported (D. Robinson).

STEM ROT (Sclerotinia sclerotiorum) affected about 3% of the plants in 2 greenhouses at Leamington, Ont.; the soil had not been previously steamed (C.D. McKeen).

WILT (?Verticillium sp.) was found affecting several varieties of cucumbers in the trial plots at the Station, Summerland, B.C. (G.E. Woolliams).

MOSAIC (virus) killed about 2% of the plants of English Telegraph in a greenhouse at Leamington, Ont. (C.D. McKeen). A few affected plants were noticed in a field at St. Martin, Laval Co., Que. (E. Lavallee).

STEM SPLITTING and FOLIAGE WILT (?chemical injury). Splitting of stems and wilting of the foliage was prevalent in southern Ont., wherever the winter greenhouse crop was grown on soil that had been treated with Dowfume G, a relatively new soil fumigant used for the control of root knot. It appeared that some component of the pesticide remained in the soil for a sufficient period to affect adversely the growth of the cucumber plants (C.D. McKeen).

EGGPLANT

WILT (Verticillium Dahliae) affected some plants in the trial plots at Summerland, B.C. (G.E. Woolliams).

GARLIC

BULB ROT (Fusarium sp.). Specimen received from Windsor, Ont. (J.D. MacLachlan).

GINSENG

ROOT ROT (Ramularia sp.) caused considerable damage to a commercial planting of Panax quinquefolium at Aldergrove, B.C. The symptoms were similar to those described by A.A. Hildebrand (Can. Jour. Res. 12:82-114. 1935) (W. Jones).

ROOT KNOT (Heterodera marioni). Infection was localized in part of one bed at Aldergrove, B.C.; damage nil (H.N.W. Toms).

KALE

CLUB ROOT (Plasmodiophora Brassicae). Infection light in a field crop at Victoria, B.C. (W. Jones) and a trace in a home garden at White Rock (H.N.W. Toms).

LETTUCE

DOWNY MILDEW (Bremia Lactucae) caused moderate damage to 2 seed crops, New York 515 at Saanichton and No. 12 at Agassiz, B.C. (W. Jones), and in a low-lying field near Keating (W.R. Foster). All plants of New York 515 were slightly damaged in a garden at Guelph, Ont. (J.D. MacLachlan).

GREY MOULD (Botrytis cinerea) caused considerable damage in a commercial planting at Victoria, B.C. (W. Jones). A few heads severely affected in a greenhouse in Queens Co., P.E.I. (R.R. Hurst).

Specimens sent to the Laboratory from Kelowna, B.C., were thought to be affected by BACTERIAL ROSETTE (Pseudomonas rhizoctonia (Thomas) Burkh.) and possibly by BACTERIAL WILT (Xanthomonas vitians (Brown) Starr & Weiss) (G.E. Woolliams). These disease have not previously been reported in Canada.

DROP (Sclerotinia sclerotiorum). Trace observed in several fields of the early spring crop in the Leamington area, Ont. (C.D. McKeen).

LEAF SPOT (Septoria Lactucae). Mod. infection present in a fall crop in a greenhouse at Leamington, Ont.; oldest leaves of every plant destroyed (C.D. McKeen, J.A. Parmelee).

BASAL ROT (cause unknown) destroyed 25% of the plants in a 2-acre field at Winnipeg, Man. The disease apparently began at the crown and spread to the bases of the leaves, which turned brown and decayed. Isolations gave no clue to the cause (W.L. Gordon).

MELON

LEAF SPOT (Alternaria cucumerina). Moderate infection observed in several fields in the Harrow and Leamington melon-growing areas in Ont. (C.D. McKeen).

SCAB (Cladosporium cucumerinum). Scattered infection observed in 4 fields at Kingsville, Ont.; scab appeared late in the season and losses were light (C.D. McKeen).

POWDERY MILDEW (Erysiphe Cichoracearum) was found in a few fields in late August in the Leamington and Harrow areas, Ont. Damage was very slight as harvesting was virtually completed before the disease developed (C.D. McKeen).

WILT (Fusarium bulbigenum var. niveum) was present in many fields in the southern part of Essex Co., Ont.; losses varied from a trace to 70% of the crop. The muskmelon variety Iroquois has remained to date completely resistant and is being widely grown where it is no longer possible to grow susceptible varieties. The disease is spreading rapidly in the area (C.D. McKeen). Wilt affected over 50% of the plants on land used 3 successive years for melons at Langham, Sask.; Fusarium spp. isolated from the plants (T.C. Vanterpool).

WILT (?Verticillium sp.) affected about 10% of the plants in a commercial field at Osoyoos, B.C. (G.E. Woolliams).

MOSAIC (virus) affected a small percentage of the plants in many fields in southern Essex Co., Ont.; however, its incidence was much less than in 1948 (C.D. McKeen).

LEAF SPOT (cause unknown), apparently new, was observed in almost every field in southern Essex Co., Ont. The spots varied in size from pin points up to over 1/8 in. in diameter. The centre became necrotic and was surrounded by a bright yellow halo when the leaf was viewed by transmitted light. The lesions had the appearance of grease spots when the lower surface of the leaf was viewed by reflected light. All isolations yielded sulphur-yellow bacterial colonies on potato dextrose agar. Preliminary pathogenicity tests were not conclusive, but the tests will be repeated (C.D. McKeen).

ONION

PURPLE BLOTCH (Alternaria Porri) appeared in fields of onions in Essex Co., Ont., as the crop was nearing maturity; damage was probably slight (C.D. McKeen).

NECK ROT (Botrytis Allii) as usual caused damage to stored bulbs in the B.C. Interior; damage varied from 10 to 25% depending on the quality of the onions at harvest and the storage conditions (G.E. Woolliams). Storage losses as high as 40% were reported for Spanish and cooking type of

onions in 1948-49 season in southwestern Ont. Neck rot was affecting a few of the Spanish onions in the field at Harrow in August (C.D. McKeen). The disease was severe on 10% of the plants in a garden in Queens Co., P.E.I., on 3 Oct. It occurs frequently on imported onions (R.R. Hurst).

BULB ROT (Fusarium oxysporum f. Cepae). Moderate infection reported in a planting at Souris, Man.; isolations made from the specimens received yielded F. oxysporum f. Cepae (W.L. Gordon).

DOWNY MILDEW (Peronospora destructor) slightly affected a few seed plants of Portugal at the Station, Saanichton, B.C. (W. Jones). In an acre field of Yellow Globe Danvers #55 at Kelowna the fungus was sporulating on one dwarfed plant and probably affected 5-6 other off-type plants present but had failed to sporulate on them. Downy mildew was prevalent on the same farm in 1948, when the bulbs for this crop were grown. Although downy mildew was epidemic in 1948, conditions were apparently not favourable for the systemic infection of the bulbs. Owing to the dry season the disease caused no damage in 1949 in the B. C. Interior (G.E. Woolliams).

PINK ROT (Pyrenochaeta terrestris) was prevalent in onions grown on muck soils in Essex and Kent Counties, Ont. In some severely affected fields in the Leamington marsh only a 20% crop was harvested. Pink root was also found in abundance on upland soils where Spanish onions are being grown. Fusarium spp. and nematodes were always found associated with P. terrestris in affected onion roots (C.D. McKeen).

ROOT ROT (Pythium irregulare Buism.) was found in flats of Spanish onion seedlings grown in greenhouses in southwestern Ont. prior to transplanting. The disease is known locally as Yellow Patch; the symptoms are yellowing and wilting of the above-ground parts and rotting of the roots. Losses up to 50% of the seedlings have been obs rved. A fuller account is appearing in Sci. Agric. (C.D. McKeen). P. irregulare was described originally from Holland in 1927 in pea roots, a lupin plant, and cucumber seeds. It is reported on several plants, including red pine seedlings, in the U.S. (I.L.C.).

SMUT (Urocystis Cepulae), affecting 1-2% of the bulbs, was found in several fields in the Leamington marsh, Ont. (C.D. McKeen).

YELLOW DWARF (virus) affected about 50% of a planted crop in a 4-acre field of Yellow Ebenezer in the eastern section of the Grand Forks district, B.C. Until this year the disease was confined to this section, which is restricted to the production of Yellow Ebenezer. A trace has now been found in the section where Mountain Danvers onion seed is produced. The disease apparently is becoming established and will seriously affect the production of onion seed in the area (G.E. Woolliams).

YELLOWS (virus). About 3% of the plants showed severe yellows in a plot at the Station, Fredericton, N.B.; 3 plants were stunted, weak, and died early in August (D.J. MacLeod).

PARSLEY

LEAF SPOT (Septoria Petroselini). Trace infection in Champion Moss Curled in the University plots, Vancouver, B.C. (H.N.W. Toms).

PARSNIP

SCLEROTINIA ROT (S. Sclerotiorum). Two affected roots brought to the Laboratory from a storage in Queens Co., P.E.I., on 18 Feb. (R.R. Hurst).

SCAB (Streptomyces scabies). One slightly affected specimen brought to the Laboratory, Charlottetown, P.E.I. (R.R. Hurst).

YELLOWS (Callistephus virus 1) severely affected a single plant in a 100 ft. row in a garden in Queens Co., P.E.I. (R.R. Hurst).

PEA

LEAF and POD SPOT (Ascochyta Pisi). Trace infection probably due to A. Pisi was found in a seed crop of Perfection peas at Mara, B.C. (G.E. Woolliams). Infection 5-tr. 5-sl. 1-mod./30 fields of seed peas inspected in southern Alta., tr.-sev. in plots at Beaverlodge, Lacombe, and Edmonton (S.G. Fushtey); and sl.-mod. in several fields near Lethbridge (M.W. Cormack). A trace was present in gardens about Guelph, Ont., and in the O.A.C. plots on 15 Aug.; peas harvested prior to this date were free of disease. Heavy infection obtained by artificial inoculation in a disease nursery at O.A.C. (J.D. Gilpatrick). Of 9 fields inspected in Renfrew Co., a trace was found in one. Also a few infected plants were seen in two fields of Arthur in Carleton Co. (A.J. Skolko, V.R. Wallen). Infection tr.-sl. in garden plantings of peas in Queens Co., P.E.I. (R.R. Hurst).

POWDERY MILDEW (Erysiphe Polygoni). Infection tr.-sev. in gardens at Beaverlodge, Lacombe, and Edmonton, Alta. (S.G. Fushtey), and mod.-sev. in the variety plots and several gardens at Lethbridge; also reported from Brooks (M.W. Cormack). Infection mod. in 2 fields at Portage la Prairie, Man. (W.A.F. Hagborg). The disease first appeared in late August and all plots not harvested by late September were infected. Damage generally slight, but in certain heavily infected plots some pods were distorted and empty (J.D. Gilpatrick). A trace infection was noted in Queens Co., P.E.I. (R.R. Hurst).

ROOT ROT and WILT (Fusarium spp.). Light infection in most gardens at Saskatoon, Sask. (H.W.M.). A 30-acre field near Brantford, Ont., inspected 26 May, showed more than 90% of the plants affected by root rot. Burning of the stems below the ground line was observed and attributed to fertilizer injury. It is believed that the burning predisposed the plants to attack. Damage was sev. on Thomas Laxton,

and Early Harvest; mod. on Pride, and Perfection; and light on Alaska. Fusarium sp. was the predominant isolate and proved pathogenic to peas. Diseased specimens were received from Listowel, Meaford, Atwood, and Sunbridge (J.D. MacLachlan, J.D. Gilpatrick). Wilt infection tr. in 6 of 9 fields of Chancellor and Valley peas examined in Renfrew Co. and tr.-50% of the plants, av. 6.5%, in 13 garden varieties in the plots, Division of Horticulture, C.E.F., Ottawa (A.J. Skolko, V.R. Wallen). Moderate infection in one field of Arthur peas at Ste. Anne de la Pocatiere, Que.; damage slight (R.O. Lachance).

MYCOSPHAERELLA BLIGHT (M. pinodes). Infection tr.-sl. in seven fields of field peas about Portage la Prairie, Man. Infection in garden peas, due possibly in part to other Ascochyta spp., tr.-mod. in different plantings at Portage la Prairie, mod. at Miami, tr. at Hadashville and Stonewall (W.A.F. Hagborg).

DOWNY MILDEW (Peronospora Pisi). Light infection on Stratagem at the Station, Saanichton, B.C. (W. Jones).

BACTERIAL BLIGHT (Pseudomonas pisi). A summary of the information available on the occurrence of bacterial blight of peas in Canada appears timely because it is one of the diseases that, it is hoped, may be controlled by means of the Health Approval scheme for pea and bean seed. Bacterial blight of peas was described in the United States in 1916 and was first reported in Canada in 1924, when it was found at St. Vital, Man. It has since been reported in Que., Ont., Sask. and Alta. By the end of 1948, 37 occurrences, of which 7 were classes as severe, had been recorded.

The severity of the disease has varied widely. In some instances the crop has been abandoned in Man. and Ont., due apparently to severe outbreaks. In other instances, the disease occurred abundantly on the stems and pods, substantially reducing the crop through reduction of the number and size of the seeds. In still other instances, the disease gained little headway and had little effect on the yield. To what extent damage was due to the use of diseased seed was still unknown.

In 1949 severe seedling damage from bacterial blight, followed by unfavourable weather conditions, resulted in heavy losses in the canning pea crop in the eastern portion of the Red River Valley, Man. A canning firm had supplied two kinds of seed: (1) grown under contract in Man. and (2) imported from the western United States. As seedling infection and severe crop loss were confined to fields grown from seed produced in Man., it appeared that the losses were due to infection carried by the Manitoba seed.

Bacterial blight has been found in field (soup) peas in Man. whenever surveys of pea crops have been made in recent years. The damage has varied in different seasons. Along with the Ascochyta diseases, primarily Mycosphaerella blight, it has contributed to the progressive deterioration in the health of seed of field peas that appears to have occurred in the past decade (Proc. Ann. Conf. Man. Agronomists 1948:21. 1948) (W.A.F. Hagborg).

Infection tr.-sl. in the plots at Lethbridge, Alta. (M.W. Cormack); 4-tr.-13-sl. 7-mod./30 fields of seed peas examined in southern Alta. and tr.

in variety plots at Lacombe (S.G. Fushtey). Infection tr.-sl. in two fields of field peas at Portage la Prairie, Man.; heavy with severe damage in garden peas at La Rochelle, mod. at Morris, and mod.-sev. in 2 plantings at Portage la Prairie (W.A.F. Hagborg). Infection tr. in 18-acre field at Cookstown, Ont. (J.D. Gilpatrick).

SEEDLING BLIGHT (Pythium sp.). A field of Wisconsin Early Sweet at Barnwell, Alta., was ploughed up in the spring because of severe rotting of the seed and seedlings. Pythium sp. isolated from the material proved highly pathogenic in greenhouse inoculation tests (M.W. Cormack).

ROOT ROT (Rhizoctonia Solani, Fusarium sp. etc.). Infection was 14-tr. 8-sl. 1-mod. 1-sev./30 fields of seed peas in southern Alta.; tr.-sev. in garden peas at Beaverlodge and Lacombe (S.G. Fushtey); and 10-sl. 5-mod. 1-sev./26 irrigated commercial fields examined in southern Alta. R. Solani predominated among the isolates, but other fungi were apparently involved in some cases (M.W. Cormack).

LEAF SPOT (Septoria Pisi). Infection tr.-50%,av. 5.6%, in 3 out of 9 fields examined in Renfrew Co., Ont., and tr. in 6 out of 13 varieties in the plots, Division of Horticulture, C.E.F., Ottawa (A.J. Skolko, V.R. Wallen).

RUST (Uromyces Fabae). Infection sl. in garden at Metchosin, B.C. (W. Jones); tr. in gardens at Meadows and Stonewall, Man. (W.A.F. Hagborg); tr. in a garden near Guelph, Ont., in an early planting of Little Marvel, but in a later planting (30 July), all plants were slightly affected (J.D. MacLachlan); tr. in 2 of 13 varieties in the plots at C.E.F., Ottawa (V.R. Wallen); and tr. in a garden in Queens Co., P.E.I. (R.R. Hurst).

MOSAIC (virus). Tr. in a garden at Beaverlodge, Alta. (T.R.D.); a few plants in a garden at Guelph, Ont. (J.D. MacLachlan); tr. of mosaic (Pisum virus 1) in a farm garden in York Co., N.B. (D.J. MacLeod).

STREAK (virus). A trace was seen in 2 of 5 fields of Canners King in Prince Edward Co., Ont., and 1% of affected plants in a field of Arthur at C.E.F., Ottawa (A.J. Skolko, V.R. Wallen).

PEPPER

EARLY BLIGHT (Alternaria Solani) developed in several transplanting beds at Harrow, Ont. Affected plants remained stunted after they were set in the field, and suffered moderate defoliation during July and August. Later, when the weather was cooler, they appeared to outgrow the disease (C.D. McKeen).

GREY MOULD (Botrytis cinerea). A trace present in one outdoor bed at Harrow, Ont.; the growing points of the young plants were destroyed (C.D. McKeen).

ANTHRACNOSE (Colletotrichum phomoides). One ripe fruit stored with tomatoes from the same garden at Kentville, N.S., developed typical lesions (K.A. Harrison).

SOFT ROT (Erwinia carotovora) destroyed 75% of the sweet pepper fruits in one 5-acre field at Harrow, Ont., and smaller amounts in other fields. The development of the disease depends largely upon the activities of the corn borer (C.D. McKeen).

LATE BLIGHT. In last year's report (P.D.S. 28:48) Phytophthora infestans was reported on pepper fruits in B.C. Dr. Charles Chupp writes: "I am wondering whether you definitely determined the species. My notes indicate that nowhere has P. infestans been definitely reported on pepper plants. There have been a number of possible cases, but I believe in each instance the fungus proved to be P. Capsici, which causes very similar symptoms". Unfortunately no isolations were made and the identity of the fungus present remains in doubt (I.L. Conners).

DAMPING OFF (Pythium spp. and Rhizoctonia Solani) occurred in small amounts in several greenhouses in the Harrow area, Ont. As in 1948, the loss did not exceed 5% of seedlings. The disease has been controlled by the use of Arasan in the soil of the seed beds. Damping-off in the transplanting beds was also reduced much below the level observed formerly, by mixing Arasan with the soil of these beds (C.D. McKeen).

SCLEROTINIA ROT (S. sclerotiorum) was found in several fields in the Vernon area, B.C.; 10-25% of the plants were killed (G.E. Woolliams).

WILT (Verticillium Dahliae) developed in 60% of the plants in a ½-acre field at Harrow, Ont., midway through the growing season; many plants died before any fruits were harvested and the rest, badly stunted, produced a poor crop (C.D. McKeen).

BACTERIAL SPOT (Xanthomonas vesicatoria). Infection was a trace on leaves and fruit in 2 fields at Harrow, Ont. (C.D. McKeen).

MOSAIC (virus) stunted 5% of the plants of Best Early in a planting in Lincoln Co., Ont. (G.C. Chamberlain).

STREAK (Solanum virus 1, N strain). Four plants showed severe streak in a field at Maugerville, N.B. The virus was identified (D.J. MacLeod).

BLOSSOM END ROT (non-parasitic) affected 3-10% of the fruits in most fields in southern Essex Co., Ont. (C.D. McKeen). Blossom-end rot was general this year at St. Martin and Ste. Dorothee, Laval Co., Que.; about 20% of the fruit was affected (E. Lavallee).

POTATO

The Plant Protection Division, Science Service, supplied the data in Tables 4 to 7 on Seed Potato Certification. All fields entered for certification are planted with Foundation or Foundation A seed.

Table 4. Seed Potato Certification:
Number of Fields and Acres Inspected, 1949

Province	Number of Fields		Fields Passed	Number of Acres		Acres Passed
	Entered	Passed	%	Entered	Passed	%
P.E.I.	8,474	7,721	91.1	37,167	34,519	92.9
N.S.	573	526	91.8	1,105	983	89.0
N.B.	3,156	2,932	92.9	24,589	21,960	89.3
Que.	1,157	782	67.6	2,837	1,728	60.9
Ont.	813	687	84.5	2,531	2,157	85.2
Man.	108	94	87.0	384	322	83.9
Sask.	89	81	91.0	204	180	88.2
Alta.	182	148	81.3	1,005	804	80.0
B.C.	924	768	83.1	2,884	2,398	83.1
Total	15,476	13,739	88.8	72,706	65,051	89.5
Previous Yearly Totals						
1948	15,635	12,504	80.0	70,561	57,392	81.3
1947	14,616	12,605	86.2	60,385	53,474	88.5
1946	14,198	11,628	81.9	66,665	55,256	82.8
1945	11,267	9,501	84.3	50,646	40,866	80.7

Acres Entered		Acres Passed	
1948	70,561	1948	57,392
1949	72,706	1949	65,051
Increase of 2,145 or 3.0%		Increase of 7,659 or 13.3%	

Table 5. Seed Potato Certification: Acreage Passed by Varieties, 1949

Variety	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.-Alta.	B.C.	Total
Katahdin	6,102	448	16,434	3	1,472	12	36	24,507
Green Mountain	9,230	96	3,306	1,633	61	18	131	14,475
Irish Cobbler	9,544	168	776	92	210	95	4	10,889
Sebago	9,296	98	398		93		4	9,889
Netted Gem	7		10		2	936	1,494	2,449
Bliss Triumph	20	107	684			34		845
White Rose			88			1	393	482
Chippewa	116	8	22		283		34	463
Pontiac	103		234			89		426
Warba	27	18	8		4	15	105	177
Columbia Russet						23	62	85
Early Epicure							83	83
Sequoia	71	11						82
Canus		1			4	44		49
Others x	3	28			28	39	52	150
Total	34,519	983	21,960	1,728	2,157	1,306	2,398	65,051

xThese varieties with acreage of each were: Early Ohio 34; Rural New Yorker (Dooley) 28; Early Rose 22; Great Scot 22; Garnet Chile 7; Up-to-Date 5; Pawnee, Carter's Early Favorite, Wee MacGregor and Sir Walter Raleigh 4; Gold Coin, Arran Victory and Mohawk 3; Clarks 3, and McIntyre 2; Champion, Burbank, and Menominee 1.

Table 6. Seed Potato Certification: Fields Rejected on Field Inspection, 1949

Province	Leaf Roll	Mosaic	Ring Rot in field	Ring Rot on farm	Black Leg	Wilts	Adjacent Diseased Fields	Foreign Var.	Misc.x	Total
P.E.I.	15	242	-	-	60	20	41	193	182	753
N.S.	5	8	4	3	3	6	9	7	2	47
N.B.	3	21	146	18	7	-	1	24	4	224
Que.	5	25	211	40	28	-	32	9	25	375
Ont.	28	2	44	3	2	6	2	-	39	126
Man.	3	-	3	3	-	3	-	1	1	14
Sask.	-	1	-	-	1	1	-	-	5	8
Alta.	1	-	2	2	15	-	1	-	13	34
B.C.	28	5	-	-	28	9	11	6	69	156
Total	88	304	410	69	144	45	97	240	340	1737
Rejections as a percentage of fields:										
Entered	0.6	2.0	2.6	0.4	0.9	0.3	0.6	1.6	2.2	11.2%
Rejected	5.1	17.5	23.6	4.0	8.3	2.6	5.6	13.8	19.5	100%

x 235 fields rejected for causes other than disease.

Table 7. Seed Potato Certification: Average Percentages of Diseases found in Fields, 1949

Average Percentage of disease found in	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
	%	%	%	%	%	%	%	%	%
Fields entered: (first inspection)									
Black Leg	.12	.09	.04	.10	-	.01	.07	.23	.13
Leaf Roll	.11	.08	.06	.04	.08	.21	.09	.08	.19
Mosaic	.24	.15	.12	.11	.06	-	.19	.02	.10
Fields passed: (final inspection)									
Black Leg	.05	.05	.03	.05	-	.01	-	.02	.05
Leaf Roll	.05	.06	.05	.04	.03	-	.03	.03	.05
Mosaic	.07	.10	.10	.04	.01	-	.05	-	.02

There was a further substantial increase in the acreage devoted to seed potato growing in 1949, and the percentage of the acreage passing inspection was the highest in the past five years. The improvement was due to the substantially fewer rejections for mosaic, leaf roll, and black leg, in P.E.I. On the other hand, rejections on account of ring rot increased, particularly in N.B. Among the varieties grown, Katahdin has maintained the lead that it established over Green Mountain and Irish Cobbler last year, and Sebago, the second most popular variety in P.E.I., is well up in fourth place.

From an examination of the data given on Seed Potato Certification over a period of years it is evident that mosaic and leaf roll have declined in importance as causes for rejection in potatoes being grown for certification. Ten years ago these two diseases accounted for half the fields rejected and in some years they caused the rejection of a quarter of the fields entered for certification. Then a drive was made to secure stocks unusually free from virus infection by selecting those of the greatest purity to form a special class of seed and by the introduction of tuber indexing and the tuber unit method of planting. The rejections for mosaic fell at once, although the prevalence of leaf roll fluctuated widely from year to year. Since 1947, however, the rejections for leaf roll have been dropping and in 1949 they were only 5.1% of the total. Although it has not been demonstrated experimentally that reduction of leaf roll is due to the control of aphids by DDT, J.B. Adams and R.A. Kelley, in a paper to appear shortly in Am. Potato Journal, remark "This is not to suggest that the use of DDT over a great portion of the potato growing area has not limited leaf roll spread to a considerable degree. It has been possible during 1948 and 1949 to raise Foundation grade seed potatoes at the Woodstock research station by a combination of isolation, good seed, weekly DDT-spraying and early top-killing and harvest". It is significant that leaf roll is also less prevalent in table-stock fields, especially in areas where DDT has been used extensively.

EARLY BLIGHT (Alternaria Solani) was found in 268 (29%) of the fields inspected in B.C., being especially widespread in the Grand Forks area; it was not quite so prevalent as last year (H.S. MacLeod). Early blight was rather late developing in northern and central Alta. A light infection was found in 44 (24%) of the fields inspected and at Beaverlodge. Infection was severe on Warba at Lacombe, where heavy infections have been noted for several years, and Edmonton with smaller amounts on other varieties (J.W. Marritt, T.R. Davidson). Early blight almost completely defoliated a field of Early Ohio at Briarlea, Sask., and infection was sev. in Warba at Norquay and mod.-sev. in other fields in eastern Sask. (A. Charlebois). Infection was negligible in Man., sl. in Rainy River District, Ont., mod. in a few fields and sev. in one (of Chippewa in the Upsala area) in the Thunder Bay District (D.J. Petty). Early blight was found in many fields in south-western Ont., but it caused no severe damage (F.J. Hudson). Light infections were seen in a few fields of early potatoes in southern Essex Co. (C.D. McKeen). It caused slight damage here and there in district 2 as a result of premature ripening of the crop (W.L.S. Kemp). Early blight caused complete destruction of two seedlings, F 4425 and F 4427, under test at Mindemoya, Manitoulin I.; the disease was not prevalent in district 3, where most fields were adequately protected (H.W. Whiteside). Infection was heavy by 30 Aug. in Carleton Co., in a field of Green Mountain, which had received several sprays of a fixed copper; a dry summer was followed by a 2-week period of rainy weather (D.S. MacLachlan). Early blight appeared on 15 Aug. in eastern Ont. and generally was not severe (O.W. Lachaine). Infection was 330-sl. 28-mod. 1-sev./1157 fields inspected in Que.; a light infection was noted in most fields in the northern sections of the province; elsewhere it was more prevalent on account of the dry weather (B. Baribeau). Early blight was distinctly prevalent in N.B., affecting 75% of the fields inspected. Already some tuber rot has been observed during early bin inspection (C.H. Godwin). Early blight was first reported on 25 July in Kings Co., N.S. Within the next month it was observed throughout N.S., but infection was severe this year in very few fields, mostly in Kings Co. No Alternaria rot has yet been observed (R.C. Layton). It occurred in negligible amounts in P.E.I. (S.G. Poppin).

BLACK DOT (Colletotrichum atramentarium) was general on dead tops of Green Mountain, Irish Cobbler, and Katahdin on 12 Oct. in Queens Co., P.E.I.; damage was nil (R.R. Hurst).

BACTERIAL RING ROT (Corynebacterium sepedonicum) was not found in any crop inspected for seed certification in B.C. (H.S. MacLeod). During field inspections at digging time covering 200 acres, one affected tuber was found in one field in the same district in the Fraser River Valley, where a trace was found last year. A trace of ring rot was also found in a carload of Irish Cobbler of the 1948 crop shipped from Kamloops; source of infection appeared to be certified seed produced in P.E.I. in 1947. Ring rot in trace amounts was detected in only one of the 217 carloads imported into B.C. (W.R. Foster).

During the Provincial survey conducted with the assistance of the Dominion Laboratory at Edmonton, ring rot was found on 118 farms (1178 acres of potatoes) out of 1052 farms (8654 acres). The percentage of farms

affected increased significantly from 6.7% in 1948 to 11.2% in 1949. Most of the increase was in the Lethbridge district, where many newcomers to the area, allegedly ignorant of the regulations, purchased seed without regard to its freedom from ring rot. On the other hand little change occurred at Edmonton and only one field was diseased at Calgary proper. The improvement at Calgary is attributed to the establishment of "approved seed houses", where certified seed potatoes may be purchased. Although it admittedly affected the picture but little, it may be mentioned that one lot of certified seed from Man. was apparently contaminated for a trace of ring rot developed in 3 of the fields where this seed was planted.

By regulating imports to check contamination from this source, by stricter enforcement of regulations governing the issuance of planting certificates and disposition of infected stocks, and by providing disease-free seed at cost, the Department hopes to curb the further spread of ring rot (W. Lobay). One of the rejections for ring rot in Alta. (Table 6) was a field planted with imported seed (J.W. Marritt).

On several occasions severe losses from ring rot have occurred in the Pike Lake area, Sask. This year in a 5-acre block of Canus, believed to be free from the disease in 1947, the grower estimated a 50% loss at digging. Two other fields in the area were also severely damaged. Other growers who have experienced trouble in the past are now ring-rot conscious and have produced crops apparently free of disease for the past 4-5 years (R.J. Ledingham). Although ring rot was not found in any field entered for certification, diseased tubers were received from Moose Jaw and Sturgis (A. Charlebois). A trace of the disease was present in 3 fields on one farm in Man. (D.J. Petty).

Ring rot was found in 4 table stock fields in Middlesex Co., Ont. (F.J. Hudson). The disease caused the rejection of 18 fields (57 acres), about half of all the rejections, in district 2. The infection was noticeably heavier than usual in the affected fields (M.L.S. Kemp). In district 3, 33 fields were rejected on account of ring rot in the field or on the same farm. The disease was found in Irish Cobbler and Katahdin only and most cases were in the Lafontaine district in northern Simcoe Co. The disease appears to have originated through the use of old bags and to have been spread by the exchange of potato machinery. Disinfection of storage bins and machinery of all seed potato growers in the area is being carried out in co-operation with provincial men (H.W. Whiteside). Ring rot was found on 8 seed growers' farms and on one at bin inspection in eastern Ont. (O.W. Lachaine).

In the 7th annual survey for bacterial ring rot conducted by the Ont. Department of Agriculture some 2250 farms were visited by the inspectors. Of these farms 590 or 26% were affected by ring rot, a considerable increase over 1948 when 3125 farms were inspected and 250 (8%) were infected. Of the infected farms, 73% were new cases and 8% had been free of ring rot for 3 or more years. In general the level of infection was quite low in the affected fields (D.S. MacLachlan).

Bacterial ring rot was again the chief cause of rejection in Que., being present in 211 (18.2%) of the fields inspected. It was most prevalent in Tomiscouata Co. and the Chicoutimi and Lake St. John districts. Ring rot was found in many lots on the table stock market and in some cases they had to be regraded with a loss of 5-8%. A 60 lb. sample of Teton was distributed to 8 growers in Temiscouata Co. to test its varietal resistance

on farms where the disease has been very persistent. No ring rot was found upon careful inspection of the plants in the field and of the tubers at digging time. The seed is being multiplied for further trial (B. Baribeau). A total of 164 fields (over 2000 acres) were rejected in N.B. on account of ring rot in the field or on the same farm. Infection was very light, only a plant or two being present at the time of inspection (C.H. Godwin).

A provincial survey was carried out on table stock in the potato-growing areas in Cumberland Co., N.S. Ring rot was found on 12 farms in fields and garden plots (5¼ acres). On at least 4 farms spread was traced to the use of the same planter. In one field of certified Irish Cobbler infection was high (10%) and was attributed to storing potatoes in contaminated bags over winter. Ring rot was also found on one farm in Colchester Co. in 30 acres of Foundation A and 16 acres of Certified seed of Katahdin. Infection was very light. The seed for planting is generally treated in second-hand bags. Formerly only formaldehyde was used, but for the last two years the seed was treated with Semesan Bel. All farms in Kings Co. where ring rot was discovered last year were reinspected; no case of ring rot was found (R.C. Layton).

Eight cases of ring rot were found after field inspection in Kings Co., P.E.I. These cases were all in Katahdin, traceable to a single seed source (S.G. Peppin). A further case was found in Queens Co. in December (R.R. Hurst).

BACTERIAL SPOT (Erwinia carotovora) was found on washed tubers held for 2 weeks in paper bags at Centerville, N.S., in early January 1949. As a result of considerable field frost the tubers soon after harvesting broke down badly in storage with some heating. To salvage the sound tubers, the potatoes were shovelled from the bins and put through a potato washer, partially dried in an air blast, and bagged for later shipment. Bacteria were consistently isolated from the spots. Cultures of the bacteria were used to inoculate sound tubers; these tubers and some of those previously affected were held in moist chambers kept in a cellar at 60°F. The inoculated tubers did not become affected and the disease progressed no further in those already lesioned. The symptoms were very similar to those illustrated in Fig. G. pl. 5, in U.S.D.A. Misc. Publ. 98 for bacterial soft rot in lenticels of northern grown late potatoes. It therefore appears that under very abnormal conditions, E. carotovora may cause a disease of potatoes in N.S. (K.A. Harrison).

BLACK LEG (Erwinia phytophthora) was found in 197 (21.3%) of the fields inspected in B.C. and caused the rejection of 28 fields or 157 acres, the largest acreage rejected for any disease. For the third year, it has increased in severity. Although the season was fairly moist, conditions in general were favourable for plant growth. Most growers do not treat their seed (H.S. MacLeod). The disease was prevalent in low-lying areas in the lower Fraser River Valley during the early part of the season (N.S. Wright). Black leg was found in 42 (23%) of the fields inspected in Alta. and caused the rejection of 15 fields, mostly in the Peers-Edson district. Elsewhere it was less prevalent than last year (J.W. Marritt). One field was rejected on account of black leg and a trace occurred in 6 others in Sask. (A. Charlebois).

Black leg was present in 4% of the fields inspected in Man.; in northwestern Ont. 35% were affected and one field was rejected, infection being 3% (D.J. Petty). Black leg was present in 2 of the fields inspected in southwestern Ont. and one field in Norfolk Co. was rejected (F.J. Hudson). Black leg was recorded in only 2 fields in district 2. It appears in some years in fields planted with stock from the Maritimes, particularly Sebago (W.L.S. Kemp). Black leg was again little in evidence in district 3 (H.W. Whiteside). Black leg was in 28 (2.4%) of the fields inspected in Que., 18 of which were in the Chicoutimi and Lake St. John districts. On some farms the fields had to be replanted due to flooding and in other fields misses were as high as 20% (B. Baribeau). Black leg was general in N.B., but only 7 fields were rejected on account of the disease. The highest infection observed was 9% (C.H. Godwin). Black leg was reported in 69 (12%) of the fields inspected in N.S. and caused 3 fields to be rejected. The highest infection was 6%, in Sebago. Although no severe infections were reported in table stock, a number of growers have reported its greater prevalence in Sebago (R.C. Layton). Black leg was definitely less prevalent in P.E.I. in 1949 than in recent years in spite of a considerable increase in the acreage of Sebago, which, as previously reported, is very susceptible. The improvement is attributed to improved planting methods such as tuber unit planting. In 1949, 60 fields were rejected for black leg as against 225 in 1948 (S.G. Peppin). Black leg ranged from trace to 1% in 15 table stock fields inspected in Queens and Prince Counties (R.R. Hurst).

WILT (Fusarium oxysporum) was found in 169 (18.3%) of the fields inspected in B.C. and caused 3 to be rejected. The disease has again increased to the 1947 level (H.S. MacLeod). Wilt affected 28 (31%) of the fields inspected in Sask., but it caused only one to be rejected (A. Charlebois). Wilt was present in 29% of the fields inspected and caused 3 to be rejected in Man.; 10% of the plants were affected in one field in the Winnipeg area. The disease affected 35% of the fields in northwestern Ont. (D.J. Petty). Wilt caused the rejection of 2 fields of Irish Cobbler in Norfolk Co.; small amounts were present in a few other fields in southwestern Ont. (F.J. Hudson). Only 2 fields were rejected for wilt in district 2 (W.L.S. Kemp). Wilt was reported to be general in district 3, but upon examination of specimens, much of the injury was diagnosed as heat necrosis and fertilizer burning (H.W. Whiteside). One field was rejected on account of wilt in eastern Ont. (O.W. Lachaine). A light infection was observed in many fields on sandy loam in Que., particularly in the Lower St. Lawrence district; it caused some reduction in yield (B. Baribeau). Wilt was not as prevalent as in previous years in N.B., as less imported seed was planted. The few cases reported were mostly in Irish Cobbler (C.H. Godwin).

WILT (Fusarium and Verticillium) was found in 13 (7%) of the fields inspected, all located in southern Alta. and under irrigation (J.W. Marritt).

DRY ROT (Fusarium spp.) was rather prevalent in a sample of certified Warba seed grown at Armstrong and on sale at Victoria in April (W. Jones). Storage rot has not been the problem it was in 1948 in northern and central Alta.; some rot developed, however, in the Brooks and Vauxhall districts (J.W. Marritt). Storage rot, which caused some loss in the fall of 1948 in Sask., continued to be troublesome throughout the winter (T.C. Vanterpool). Some dry rot was reported in the southern part of district 3, Ont. (H.W. Whiteside). Storage rot was widespread in Que., but the average infection was low. The highest infection recorded was 11% (B. Baribeau). Storage rot was unusually prevalent in N.B. in the 1948-49 crop; the average infection was estimated to be 6% of the tubers (C.H. Godwin). Storage rot (F. sambucinum f. 6) slightly affected the 1948 crop in P.E.I. whereas the 1946 and 1947 crops became seriously affected (G.W. Ayers). Losses in the 1949 crop have not exceeded 1% and the damage is largely confined to Sebago, which is very susceptible (S.G. Peppin).

LENTICEL NECROSIS (Fusarium sp.). Isolations from 15 spots from a large number of small necrotic spots on a large Katahdin tuber from Lafontaine, Ont. yielded the same Fusarium from 9. Similarly spotted tubers have been seen in the Botany plots for 2-3 years (H.N. Racicot).

SKIN SPOT (Oospora pustulans) was severe on a single Chippewa tuber received from Englehart, Ont. (H.N. Racicot).

RHIZOCTONIA (Pellicularia filamentosa (R. Solani) was present in 763 (83%) of the fields inspected in B.C.; the infection being 428-sl. 293-mod. 42-sev. Infection on the tubers was generally sl.-mod. (H.S. MacLeod). Infection was mod. in 18 (10%) of the fields inspected with slight amounts in a few other fields in Alta. A severe frost on 12 Sept. destroyed top growth earlier than usual and tubers dug after 1 Oct. bore some sclerotia (J.W. Marritt). Infection was mod. in several fields of Warba and light in most others in Sask. (A. Charlebois). A single plant received by mail from Ile a la Crosse was severely affected at the base of the stem and the half dozen tubers enclosed were covered with sclerotia (H.N. Racicot). Rhizoctonia caused no appreciable loss in Man. and northwestern Ont. (D.J. Petty). Infection light in southwestern Ont. (F.J. Hudson). About 25% of the crops were affected by rhizoctonia in district 2; infection averaged about 5-7% and reached 20-25% on the more severely affected fields, mostly located on the lighter soils in York, Ontario and Durham Counties (W.L.S. Kemp). Sclerotia were more prevalent on the tubers in district 3 than usual; cool wet weather prevailed during September (H.W. Whiteside). Infection was light in Que. Sclerotia were found on tubers in a few bins mostly located in the Montreal district and the Eastern Townships (B. Baribeau). Plant infection was sl.-mod. in N.B. this season with light sclerotium development on most lots of tubers (C.H. Godwin). Rhizoctonia was much less prevalent than usual in N.S. Field infection was sl.-mod. in a few fields where potatoes have been planted on the same ground for a number of years. In one field 30% of the plants were affected, 20% severely, by rhizoctonia (L.C. Layton). Rhizoctonia was negligible in P.E.I. (S.G. Peppin).

LATE BLIGHT (Phytophthora infestans) was reported in 60 (6.5%) of the fields inspected in B.C., a marked decline from its prevalence in 1948 (H.S. MacLeod). Late blight appeared late in the season in a few fields about Courtenay and North Saanich and affected tubers were received from Kelowna; dry weather slowed up its development (W. Jones). The disease was of no importance where the crop was protected by a fungicide (N.S. Wright). A trace was seen in one field at Wawota, Sask., and affected tubers were received from a grower in the same district (A. Charlebois, H.N. Racicot). Late blight was not reported in Man. (J.E. Machacek). Late blight was light to heavy on the foliage in the Rainy River and part of the Thunder Bay districts in northwestern Ont., although it caused little tuber rot (D.J. Petty).

Continuously hot, dry weather during the summer held late blight in check and consequently it was of little economic importance in Ont. in 1949. A few reports were received from north of Georgian Bay and Lake Huron 15 Aug.-1 Sept., but no serious losses occurred except in unsprayed fields in the Cochrane area, where the season was exceptionally wet. Late blight did develop in widely scattered areas in southern Ont. in October, when weather conditions became favourable for the disease. Tuber infection was favoured by the late growing season and lack of killing frosts (J.D. MacLachlan, H.W. Whiteside). Late blight affected 90% of the tubers in 4-acre field of Green Mountain and 20% of the tubers in an adjacent field of Katahdin at Leamington. Infected tubers also received from Blenheim (C.D. McKeen). In eastern Ont., the first report of late blight was not received until 8 Oct. The season was abnormally hot and dry until late August when it turned first wet and cold and finally wet with temperatures favourable for late blight spread (H.N. Racicot).

Late blight was exceptionally light in Que. in 1949. It appeared late almost simultaneously throughout the province and spread very slowly except in the Lake St. John district where conditions were more favourable for its spread. The disease was held in check by the low relative humidity prevailing over most of the province and severe frosts in September in the eastern part reduced foliage infection. A few tubers were found affected in northern and eastern regions at harvest. Teton growing side by side with Green Mountain proved just as susceptible to late blight as the latter variety (B. Baribeau, H. Genereux). Late blight rot was showing on 20% of tubers when the crop was harvested 20 Oct. at the Station, Ste. Clothilde, following very heavy rain in the preceding 3 weeks (D.S. MacLachlan).

Weather during the growing season was hot and dry in N.B. Although late blight was observed in August, infection remained very light. Very little tuber rot developed and most of it was confined to plants receiving too little spray, particularly those at the end of the rows (C.H. Godwin).

Late blight appeared first in N.S. in the Scotts Bay district, Kings Co., on 2 Aug. Although little late blight was in evidence elsewhere up to 1 Sept., it later became general in districts where little or no spraying is done. On 15 Nov. in Cumberland Co. 1/2 the crop in 2 bins of Irish Cobbler were affected by rot (R.C. Layton). Late blight was rather late in making its appearance in P.E.I. and caused defoliation

in only isolated cases in late August. Tuber rot was more or less general in many fields at harvest time and the final loss was placed at 10-12% of the crop. Green Mountain, Irish Cobbler and Katahdin were the worst affected whereas Sebago was definitely resistant (S.G. Poppin). A prolonged wet period caused a severe epidemic in late September. Many growers of Green Mountain and Katahdin suffered losses from tuber rot (L.C. Callbeck).

LEAK (Pythium ultimum). Considerable loss from set rot occurred in a 2-acre field due to planting sets in warm soil at North Saanich; a slight loss also occurred when tubers were harvested during warm weather (W. Jones). Tubers affected by leak were received from Kentville, Ont. 22 Dec. 1948 (L.T. Richardson). Tubers affected by leak were found in samples sent in for examination from Porquis Junction and Barrie (D.S. MacLachlan). What was probably this disease was again present in district 3, but was not as serious as in 1948 (H.W. Whiteside, I.L. Conners). A small amount of leak was present in tubers in early storage at the Station, Ste. Clothilde, Que. (D.S. MacLachlan).

SILVER SCURF (Spondylocladium atrovirens) was more prevalent in district 3, Ont., than in 1948 (H.W. Whiteside). A light infection was noted in a few lots of Irish Cobbler and Green Mountain in Que. at bin inspection (B. Baribeau). Infection was sl.-sev. on every Katahdin tuber of 14 received from Bath, N.B. (H.N. Racicot). Silver scurf was present on 7% of the tubers in a lot of Irish Cobbler in storage in Queens Co., P.E.I., on 27 March (R.R. Hurst).

POWDERY SCAB (Spongospora subterranea) was not reported in any field or bin inspections in B.C., but heavily infected tubers were collected by the B.C. Marketing Board in Vancouver from a shipment of White Rose from Cloverdale (H.S. MacLeod). A moderately infected tuber of Netted Gem was seen from Burnaby (N.S. Wright). Warba potatoes grown at Hines Creek, Alta., were affected (A.W. Henry). A sl.-mod. infection was noted in a few lots at bin inspection, mostly in Temiscouata Co., Que. (B. Baribeau).

COMMON SCAB (Streptomyces scabies) was in general less prevalent in B.C. than in 1948. However, it was more prevalent in the Salmon Arm-Armstrong area and caused there a few crops to be rejected (H.S. MacLeod). Infection was considerable on White Rose and Green Mountain grown on muck soil at Keating (W. Jones). No scab was found on Netted Gem in Alta. this year but trace infections were observed on other varieties at Lacombe, Edmonton and Beaverlodge (J.W. Marritt, T.R. Davidson). Scab was severe on Early Ohio and particularly on Warba from adjacent fields at Algrove, Sask. (A. Charlebois). It was also severe on Canus grown on new land at Yorkton and on Bliss Triumph on very porous soil at Barford (H.W.M.). Two tubers with about 90% of the surface covered by scab were received from Prince Albert; they were from the 3rd successive crop after breaking and the land had been manured last year (T.C. Vanterpool). Infection was heavy on Canus grown near Brandon, Man. Scab was light in a few other fields in Man. and northwestern Ont. (D.J. Petty). Scab was more prevalent than usual in southwestern Ont.; many crops were moderately affected (F.J. Hudson).

Common scab again reduced the amount of stock that could be graded for seed by 20-25% in district 2. In some fields notably in Dufferin and Wellington Counties scab infection was 75-100% (W.L.S. Kemp). The incidence of scab remains unchanged in district 3. It was more prevalent on heavier soils. A slight increase in the depth of planting appeared to reduce the amount of scab. The use of fertilizers of a higher analysis (4-12-10) with acid fillers also seemed beneficial (H.W. Whiteside). Infection was generally sl.-mod. in Que. A few scabby lots had to be discarded due to excessive liming in previous years (B. Baribeau). A grower just starting to farm at Calumet used horse manure on his 8-acre potato field; the tubers were severely scabbed (H.N. Racicot). Scab infected up to 10% of the tubers in scattered lots in N.B.; in the severe cases the crop was grown on ground that had received a heavy application of lime (C.H. Godwin). Common scab was quite prevalent in N.S. in 1949 as a result of dry weather for part of the season and of planting potatoes on old orchard ground. The average infection in the bins so far inspected was about 7%. The 5 highest infections seen were: Pawnee, one lot 75%, another lot nearly 100% with 10% severe; Bliss Triumph 30% with 10% severe; and Irish Cobbler, 2 lots, 50% light scab (R.C. Layton). Common scab was prevalent on all varieties except Sebago in P.E.I. with an average loss of 3%; Sebago is relatively resistant (S.G. Peppin).

WART (Synchytrium endobioticum). An affected plant was received from Leonard Power, Colinet Island, St. Mary's Bay, Nfld. (F.L. Drayton). For a discussion of the wart situation in Nfld. see special report, Plant Diseases in Newfoundland, by J.F. Hockey, included in the Introduction (I.L.C.).

WILT (Verticillium albo-atrum). A few plants wilted down in a plot of Epicure at Saanichthon, B.C.; the fungus was isolated from affected stems (W. Jones). A slight infection of both Verticillium wilt and Fusarium wilt were observed in Teton at Ste. Anne de la Pocatiere, Que. The organisms were isolated and their pathogenicity proved. Field symptoms were similar to bacterial ring rot (R.O. Lachance). Verticillium wilt was found in 57 (10%) of the fields inspected in N.S. and caused 6 to be rejected. Highest infection recorded was 11%. Specimens were collected for determination of the pathogen by the Kentville laboratory (R.C. Layton). There was a noticeable increase in the incidence of wilt in Prince and Queens Counties, P.E.I., whereas only an occasional field was affected in Kings. The increase in these two counties was attributed to the increase in the acreage of Sebago, which is very susceptible to wilt (S.G. Peppin). In a field of Sebago in Queens Co., 25% of the plants were infected. A slight to moderate infection occurred in many Sebago and Irish Cobbler fields in Queens and Prince Counties (G.W. Ayers).

FOLIAR NECROSIS (Solanum virus 6). Two seedlings showed severe foliar necrosis in a test plot in York Co., N.B. (D.J. MacLeod).

LATE LEAF ROLL (virus, undetermined) was common on potato fields in York, Sunbury, Carleton and Queens Counties, N.B. It was

observed in Pontiac, Irish Cobbler, Bliss Triumph, Sebago, and 12 seedlings. When scions from Pontiac and Bliss Triumph were grafted to Lycopersicum esculentum and L. hirsutum typical symptoms of the bunch top virus were produced. This result seems to indicate that late leaf roll is a phase of the current season symptoms of the bunch-top virus (cf. P.D.S. 27:69. 1948) (D.J. MacLeod).

LEAF ROLL (virus) was found in 260 (28.1%) of the fields inspected in B.C. and caused the rejection of 28 fields. Although fewer fields were infected, there was more disease in the affected fields than in 1948. The most noticeable increase occurred in the Salmon Arm district (H.S. MacLeod). Leaf roll was found in 43 (23.6%) of the fields inspected in Alta., an increase over 1948 attributed to late-season spread especially in Edmonton district but also about Lacombe (J.W. Harritt). Leaf roll was observed in 23 (32%) of the fields inspected in Sask. (A. Charlebois); in 20% of the fields inspected in Man. and caused the rejection of 2 with 10% leaf roll on one farm in the Portage la Prairie district. In northwestern Ont. leaf roll was present in half the fields and caused 5 fields to be rejected about Fort Frances, an increase over previous years (D.J. Petty). Leaf roll was present in several fields entered for certification in southwestern Ont. and caused one to be rejected (F.J. Hudson). Leaf roll caused 13 fields to be rejected in district 2. Planting varieties beside or near Katahdin seems to increase the incidence of leaf roll (W.L.S. Kemp). Only 6 fields were rejected for leaf roll in 1949 in district 3. Most growers whose fields were rejected in 1948 obtained new seed of Chippewa from Cochrane; all fields grown from seed from this source passed Foundation A (H.W. Whiteside). Leaf roll caused the rejection of 3 fields in eastern Ont. (O.W. Lachaine). Leaf roll was noted in only a few fields in Que. and only 5 fields (0.4%) were rejected (B. Baribeau). The disease was present in 22% of the fields inspected in N.B. and only 3 fields were rejected (C.H. Godwin). Leaf roll was reported in 121 (21%) of the fields inspected in N.S. and caused the rejection of only 5. Highest infection 3% (R.C. Layton). Leaf roll was much less prevalent than in 1948 in P.E.I. Only 15 fields were rejected in 1949 compared with 156 in the previous year (S.G. Peppin). In 25 table stock fields in Queens and Prince Counties, P.E.I., leaf roll infection ranged from a trace to 7% and averaged less than 0.5%, somewhat less than in 1948 (R.R. Hurst).

LEAF STREAK (Solanum virus 1, N strain). A trace was found in Chippewa, Katahdin, Sequoia, and 9 seedlings in York Co., N.B. (D.J. MacLeod).

AUCUBA MOSAIC (Solanum virus 8). Three Green Mountain plants showing a marked aucuba mosaic were found in a field of table stock in York Co., N.B. (D.J. MacLeod).

CRINKLE MOSAIC (Solanum viruses 1,2, and 3) was common in table stock of Green Mountain in York, Sunbury and Carleton Counties, N.B.; infection ranged from 1 to 3% (D.J. MacLeod).

LEAF ROLLING MOSAIC (Solanum virus 11). A trace was found in 2 fields of uncertified Green Mountain in York Co., N.B. (D.J. MacLeod).

MILD MOSAIC (Solanum virus 11). A trace to 3% was found in table stock fields of Irish Cobbler in York and Carleton Counties, N.B. (D.J. MacLeod).

MILD MOSAIC (Solanum virus 3). A trace to 7% was found in Green Mountain table stock in York, Sunbury and Carleton Counties, N.B. (D.J. MacLeod). This form of mild mosaic may be seen in many fields of Green Mountain in P.E.I.; infection ranged from a trace to 20% in the fields examined in Queens Co. (R.R. Hurst).

MOSAIC (virus) was found in 179 (19.3%) of the fields inspected in B.C. and only 5 fields were rejected; these figures represent a slight decrease from 1948 (H.S. MacLeod). Mosaic was found in only 8 (4.4%) of the fields inspected in Alta. (J.W. Marritt); in 33 (37%) with 1 field rejected in Sask. (A. Charlebois); in but 4 fields in Man. and in 20% of the fields with 1 field rejected in northwestern Ont. (D.J. Petty). A very few plants were affected with mosaic in the fields inspected in southwestern Ont. (F.J. Hudson). A single rejection on account of mosaic in district 2 (W.L.S. Kemp). Only a very mild type of mosaic was reported throughout district 3 and was only visible during first inspection in July (H.W. Whiteside). Mosaic was less prevalent in Que. than last year and only 25 fields were rejected; this decrease is attributed to the more general use of seed from tuber-indexed material (B. Baribeau). Mosaic symptoms were more prominent than usual in N.B. Katahdin, the most commonly grown variety, showed a small percentage, whereas a high count was recorded in Green Mountain (C.H. Godwin). Mosaic was found in 155 (27%) of the fields inspected in N.S. and caused 8 to be rejected. Mosaic has increased during the past 2 years (R.C. Layton). Mosaic was again about as prevalent as it was in 1947 in P.E.I.; the number of fields rejected on account of mosaic was 358 in 1947, 1,122 in 1948 and 242 in 1949 (S.G. Peppin).

RUGOSE MOSAIC (virus). A 25% infection was reported in a field of Green Mountain at Ashton, Ont. (H.N. Racicot). A trace to 4% of rugose mosaic (Solanum virus 2) was found in table stock of Green Mountain in York and Sunbury Counties, N.B. (D.J. MacLeod). Rugose mosaic affected 2-7% of the plants in several fields of Green Mountain table stock in Queens Co., P.E.I. (R.R. Hurst).

NET NECROSIS (virus) was found in 2 lots of Green Mountain table stock in the market at Fredericton, N.B. affecting 47 and 62% of the tubers respectively. Eight of these tubers gave rise to dwarfed, chlorotic plants. Solanum virus 14 (leaf roll) and bunch-top virus were found in all these plants. Thus this net necrosis was evidently due to a combination of the 2 viruses (D.J. MacLeod).

PURPLE DWARF or HAYWIRE (virus) was found in small amounts in 12 (6.6%) of the fields inspected in Alta. (J.W. Marritt).

PURPLE or BUNCH TOP (virus). Infection ranged from a trace to 7% in 52 (58%) of the fields inspected in Sask. (A. Charlebois). In Man. 55% of the fields inspected showed 0.5-2% of affected plants

and 7% in one field in the Selkirk district; in northwestern Ont. infection ranged from 0.5 to 2% in 95% of the fields inspected (D.J. Petty). The occasional plant was found affected in fields of Katahdin in southwestern Ont. (F.J. Hudson). Only an odd plant was affected by purple top in a few fields in district 2 (W.L.S. Kemp). Purple top was less prevalent in southern part of district 3 and more prevalent in the north especially in Katahdin, Sebago and Green Mountain (H.W. Whiteside). Typical symptoms of bunch top were present in Irish Cobbler plants from Richmond on 22 July; the grower stated the whole field (3 acres) appeared to be going down with the disease (H.N. Racicot).

Bunch top was general in potato fields in Carleton, York, Sunbury and Queens Counties, N.B., infection ranging from 1 to 42%. The current season symptoms of the disease were found in Green Mountain, Irish Cobbler, Bliss Triumph, Katahdin, Sequoia, Sebago, Chippewa, Pontiac, and Houma. The secondary or haywire stage was noted in Green Mountain, Sebago, Sequoia, and Katahdin. An examination of seed pieces that had remained firm and intact during the growing season in fields of Green Mountain, Irish Cobbler, Bliss Triumph and Katahdin revealed that 87% were infected with the bunch-top virus. A number of these produced weak plants showing the secondary or haywire stage of the disease when they were grown in the greenhouse. The bunch-top virus was transmitted by dodder from milkweed, Asclepias syriaca, to Lycopersicum esculentum. The milkweed plants showed severe symptoms of yellows (D.J. MacLeod). The transmission of bunch-top from milkweed to tomatoes by means of dodder should prove a useful technique in determining whether one or more strains of yellows occur in Canada, of which aster yellows is the oldest and best known. When this fundamental information is obtained it may be possible to determine what other vectors, besides Macrosteles divisus, are responsible for the transmission of this group of virus diseases in this country (I.L. Conners). Purple top, av. infection 1.8%, affected 12 fields of Katahdin and Sebago in N.S. (R.C. Layton). Purple top was more prevalent than usual in P.E.I. in 1949. Up to 50% of the plants were affected in some fields of Sebago, particularly those about Charlottetown (S.G. Peppin).

SPINDLE TUBER (virus). A trace was found on one farm in southern Alta. (J.W. Marritt). The disease affected 5% of the tubers in a first generation crop from certified seed at Birds Hill, Man. (W.A.F. Hagborg). Spindle tuber was virtually absent in Man. and northwestern Ont. (D.J. Petty) and in district 3 of Ont. (H.W. Whiteside). The disease was not reported in Que. in 1949, but there were many off shape tubers noted in areas where drought injury occurred (B. Baribeau). Three cases were reported in Irish Cobbler in N.B. (C.H. Godwin). Spindle tuber was noted in N.S. (R.C. Layton). The disease increased in prevalence in P.E.I. and caused 21 fields to be rejected. It was found in the 4 leading varieties, Irish Cobbler, Green Mountain, Katahdin and Sebago, particularly in the latter (S.G. Peppin). A trace to 1% of spindle tuber was found in 11 out of 16 fields of Irish Cobbler table stock examined in Queens Co., P.E.I. (R.R. Hurst).

WITCHES' BROOM (virus) was found in 106 (11.4%) of the fields inspected in B.C. and one field was rejected. The disease has been less prevalent for the past 2 years than formerly (H.S. MacLeod). Witches'

broom was found in 2 fields in the Peers district, Alta. (J.W. Marritt) and in a field of Green Mountain in the North Bay district, Ont. (H.W. Whiteside). A trace of witches' broom (Solanum virus 15) was found in Green Mountain stock sent in from N.B. for tuber indexing. The virus was transmitted by grafting to Lycopersicum esculentum and L. hirsutum in which it produced typical symptoms of witches' broom (D.J. MacLeod). The disease affected 2% of the plants in a field in Kings Co., P.E.I. (R.R. Hurst).

YELLOW DWARF (virus). A few cases were observed in northern Ont. (H.W. Whiteside). Two plants of a seedling were found affected by yellow dwarf (Solanum virus 16) in an experimental plot in York Co., N.B. (D.J. MacLeod).

FERTILIZER BURN was observed on tubers received from 2 places in Simcoe Co. The soil was said to be light and sandy (H.N. Racicot).

FROST INJURY. Net necrosis due to frost killing the plants was quite prevalent in the Cariboo and other areas in the interior of B.C. (H.S. MacLeod). Some frost necrosis was also observed at North Saanich (W. Jones). Several fields were injured by frost in northern Ont. and the tubers showed typical breakdown at harvest (H.W. Whiteside). Heavy frost in northern districts of Que. caused some tuber damage and a few growers had to regrade their stocks (B. Baribeau).

GIANT HILL was much more prevalent in B.C. than in 1948; it was reported to a slight extent in most crops and caused 2 fields to be rejected. The increase is attributed in part to late blight masking symptoms of the disease on second inspection last year (H.S. MacLeod). Small amounts of giant hill were seen in 16 (8.8%) of the fields inspected in Alta. (J.W. Marritt). Giant hill was more prevalent than usual in northern Ont. (H.W. Whiteside). A few cases of giant hill were noted in Que. (B. Baribeau). The disease was observed in one field of Green Mountain near Fredericton, N.B. (C.H. Godwin).

HEAT INJURY. Some light net necrosis due to heat or drought occurred in a few areas in B.C. (H.S. MacLeod). Some wilting and discoloration of the vascular ring was noted in district 3, Ont. (H.W. Whiteside).

LIGHTNING INJURY was observed in 3 widely scattered fields in Que. (B. Baribeau).

LOW TEMPERATURE INJURY. In all, 15 cases of severe chilling of potatoes in storage in Queens Co., P.E.I., were referred to the laboratory; in one lot 10% of the tubers were severely injured (R.R. Hurst).

MAGNESIUM DEFICIENCY caused moderate damage to a field of Green Mountain at Charlottetown, P.E.I., on land that had been heavily limed but had not received any manure for several years (D. Robinson).

NET NECROSIS was noted during bin and shipping inspection in Temiscouata, Champlain and Nicolet Counties, Que.; infection was light in Green Mountain (B. Baribeau). Except for a few lots of Green Mountain in Sunbury Co., less than 1% of the tubers showed symptoms in N.B. (C.H. Godwin).

STEM-END BROWNING. Only a few cases were observed in Green Mountain in Que.; the long growing season permitted the crop to mature fully (B. Baribeau).

WIND INJURY. Early in July several specimens of potato vines were received which had the appearance of having been twisted off at the ground level. The same condition was observed in several patches in the Harwarden area in Sask.; in these patches 20% of the plants similarily affected were dead or dying. A. Charlebois reported the trouble at Indian Head. In every case the plants were partially protected by a windbreak. It was concluded that the windbreaks caused a swirling of the high winds and where this occurred numerous plants were twisted partially or completely off (R.J. Ledingham).

RADISH

CLUB ROOT (Plasmodiophora Brassicae) affected a few plants in the University seed-testing plots, Vancouver, B.C. (H.N.W. Toms).

RHUBARB

CROWN GALL (Agrobacterium tumefaciens) found on one plant in a home garden at Summerland, B.C. (G.E. Woolliams).

CROWN ROT (cause unknown) severely affected 3 plants of Macdonald at Charlottetown, P.E.I. (D. Robinson).

RED LEAF (cause unknown) was severe on several varieties, especially Ruby and Valentine, at the Station, Lacombe, Alta. Canada Red and Macdonald appeared healthy (T.R.D.).

SPINACH

DOWNY MILDEW (Peronospora Spinaciae). A survey of the marshes at Thedford, Ont., on 7 June revealed localized outbreaks of the disease, with considerable damage in one field (J.D. MacLachlan).

SQUASH

POWDERY MILDEW (Erysiphe Cichoracearum) was present on most plantings late in the season in southern Essex Co., Ont. (C.D. McKeen).

SOFT ROT (Rhizopus sp.) severely affected 2 squash, the tips of which had been broken off, in a garden in Queens Co., P.E.I. (R.R. Hurst).

SWEET CORN

SMUT (Ustilago Maydis). Traces were noted in single gardens at Ste. Anne de la Pocatiere, Ste. Croix and Rosemere, Que. (A. Payette). A specimen was received from Aroostook Junction, N.B. (H.N. Racicot). A few smutted ears were seen in a garden in Queens Co., P.E.I. (R.R. Hurst).

TOBACCO

The diseases of tobacco in Ont. was summarized by L.W. Koch in a special report.

Diseases in the Seedbed

BLUE MOULD (Peronospora tabacina) was first reported in the New Tobacco Belt, Ont., on 15 May, a day or so earlier than in any previous year. Infection quickly became widespread in this area, but damage was less than usual because not only were conditions generally unfavourable for the development of the disease but also spraying or dusting were widely practised for its control.

In the Old Tobacco Belt blue mould did not appear until after mid-May when transplanting had already begun. Damage was considerably less than for the past several years on account of abundant sunshine and low precipitation during the critical period.

YELLOW PATCH (excessive nutrients) caused mild damage in the Old Tobacco Belt in Essex and Kent Counties and moderate damage throughout the New Tobacco Belt. Although most growers are aware of the cause, many still err on the side of over fertilizing their tobacco seedbeds.

DAMPING-OFF (Pythium sp. and Rhizoctonia sp.) was responsible for the complete loss of some seedbeds, particularly in Kent Co., during the early season. These losses occurred during a prolonged wet period in unsteamed seedbeds.

MUSHROOMS caused moderate damage in Kent County seedbeds. In this area there appears to be a relationship between tobacco seedbed preparation and the trouble.

2,4-D (Dichlorophenoxyacetic Acid) INJURY. Several cases of injury from this chemical occurred again this year. One case was traced to the use of an improperly-cleaned knapsack sprayer.

Diseases in the Field

BLUE MOULD (Peronospora tabacina). Mild damage was reported on the lower leaves of plants in some fields in the St. Thomas area.

BROWN ROOT ROT (nematodes) caused severe damage in some fields of burley tobacco in Essex County. As usual, the varieties Harrow Velvet and Halley's Special were most affected. Soil fumigants proved highly effective in control of the disease in field plots at Harrow.

BLACK ROOT ROT (Thielaviopsis basicola) caused stunting and moderate damage in certain fields of flue-cured tobacco in the New Tobacco Belt. Little damage occurred in the Old Tobacco Belt where resistant burley varieties predominate.

MOSAIC (virus) was widespread and caused very considerable damage in the burley tobacco crop of Essex and Kent Counties. The disease has increased markedly during the past few years and cucumber strains actually appear to predominate in certain areas.

RING SPOT (virus) was observed to be quite widespread in the Old Tobacco Belt; damage was slight.

FRENCHING (cause undetermined) was widespread in parts of Essex and Kent Counties. Again the disease was much more prevalent in poorly-drained fields or portions of fields. On the other hand, a few cases were observed on high, well-drained sandy soils.

SORE SHIN (?Rhizoctonia Solani) was again observed in a few fields in Essex County. Damage was slight.

ANGULAR LEAFSPOT (Pseudomonas angulata) was responsible for considerate late-season damage in Essex Co. Although this disease occurs to some extent each year, more damage was reported this year than usual, possibly due to abundant moisture during the harvesting season and the thin nature of much of the leaf.

Other Observations

MOSAIC (virus). Young infected plants appeared to be more numerous than usual in the fields of the tobacco area in Que. this spring, but spread of the disease was curtailed by a long period of drought (F. Godbout).

TOMATO

EARLY BLIGHT (Alternaria Solani). In general, infection was relatively light in fields of early tomatoes in the Leamington area, Ont. (C.D. McKeen). It was in general moderate in Ont., but there were a few severe outbreaks (J.D. MacLachlan). Early blight was general, particularly on the lower leaves, in the Montreal district, Que. (E. Lavallee). One basket in eight of mature green fruit was being discarded at harvest in early September in a field near Gaspereaux, N.S.; the field was in potatoes in 1948 (K.A. Harrison). Only traces of early blight were observed late in the season in Queens Co., P.E.I., but some affected fruit were brought to the laboratory in late October (R.R. Hurst).

GREY MOULD (Botrytis cinerea) affected the occasional fruit touching the ground late in the season at Kentville, N.S. (K.A. Harrison).

LEAF MOULD (Cladosporium fulvum) caused negligible losses in the greenhouse fall crop in southwestern Ont.; where the resistant variety, Improved Bay State, was grown; considerable infection and loss of foliage were observed where V121 had been used (C.D. McKeen). Leaf mould was prevalent in gardens and O.A.C. plots, Guelph, late in the season. Severe defoliation was common, but the disease developed too late to affect appreciably the yield and quality of fruit. A severe infection was present on the lower leaves of tripod-staked tomatoes in a field in Middlesex Co. on 13 July, but no further observations were made (J.D. MacLachlan). A trace was seen in one greenhouse in April in Queens Co., P.E.I. (R.R. Hurst).

ANTHRACNOSE (Colletotrichum phomoides) was particularly prevalent in the canning crop in Essex Co., Ont. The entire crop of an 11 acre field at Harrow was a total loss due to numerous lesions on most fruits (C.D. McKeen). A few severe outbreaks were recorded particularly in southwestern Ont. (J.D. MacLachlan). Although no anthracnose was observed on green fruits at harvest from a garden in Westboro it developed on a few fruits as they ripened indoors (H.N. Racicot). Anthracnose affected 20% of the fruits of Stokesdale in storage from a garden in Kentville, N.S. (K.A. Harrison). About 2% of the fruit were affected in a garden in Queens Co., P.E.I. (R.R. Hurst).

ROOT ROT (Colletotrichum sp.) practically ruined a crop of V121 in a greenhouse in Middlesex Co., Ont., by 13 July, while Michigan State yielded a moderate crop although the plants were affected by the disease. In another greenhouse in the county V121 was so severely affected that almost the whole crop was ruined. Specimens were also received from greenhouses in the Burlington area. The disease is characterized by sloughing of the cortical tissue. The pathogen has yet to be determined specifically (J.D. MacLachlan).

BACTERIAL CANKER (Corynebacterium michiganense) caused little damage in the Okanagan Valley, B.C., but in a crop being grown for seed at Vernon about 10% of the plants were affected (G.E. Woolliams). The disease caused some trouble in a breeding project at the Station, Swift Current, Sask. (H.W. Mead). Infection was a trace at the University farm, Winnipeg, Man., in a small planting probably grown from untreated seed. After the severe losses from bacterial canker in 1948, most of the seed planted at the University was treated with hot water at 50°C. for 25 min. with excellent results (W.A.F. Hagborg). Affected Bounty fruits were received from 2 fields in Essex Co., Ont. (C.D. McKeen). A moderate infection was reported from 2 farms at Neuville, Portneuf Co., Que. The disease was observed 2-3 years previously, but this year the damage was sufficient to cause some alarm. The pathogen was isolated and tested by inoculation into healthy plants (O. Caron, A. Payette). Diseased specimens were received from Leitches Creek, N.S. (K.A. Harrison).

FUSARIUM WILT (F. Lycopersici) caused severe damage in a commercial field at Medicine Hat and another at Taber, Alta. (M.W. Cormack). Wilt affected 50% of the plants in two 4-acre fields of early tomatoes at Kingsville, Ont.; yields were reduced 30% due to the wilting and premature death of the plants. Tomatoes had been grown continuously for several years in these fields (C.D. McKeen). One plant out of 60 was affected by wilt in a garden at Ottawa on 21 July (H.N. Racicot).

ROOT KNOT (Heterodera marioni) affected a single plant in a private garden at Vancouver, B.C.; the plants were originally greenhouse grown (H.N.W. Toms).

LATE BLIGHT (Phytophthora infestans) was observed in only 2 fields of tomatoes in Essex Co., Ont., in 1949. The relative freedom from disease in field crops was in marked contrast to its incidence in 1946, 1947, and 1948. However it caused considerable destruction of fruit and foliage in 4 widely separated greenhouses in southern Essex late in the fall (C.D. McKeen). Late blight was of no economic importance on field and garden tomatoes in Ont., due chiefly to the weather being hot and dry this summer. The harvest was well advanced in most fields before late blight became established in potato fields. The late blight warning service saved growers needless expenditures on sprays and dusts (J.D. MacLachlan). A moderate infection was present at West River, N.S., on 8 Oct. (R.G. Ross). Late blight caused considerable damage to the late tomato crop throughout P.E.I. (R.R. Hurst).

BUCKEYE ROT (Phytophthora parasitica) caused considerable damage in one greenhouse at Victoria, B.C. (W. Jones).

BROWN ROT (Pseudomonas solanacearum E.F.Sm.). The pathogen was isolated from a specimen submitted by an inspector from the Kitchener area, Ont. The affected plant showed the typical symptoms of brown rot and the organism isolated agreed well with P. solanacearum, but no pathogenicity tests were made. Whether the plants were imported or grown locally is unknown (E.H. Gerrard). This disease of the southern U.S. has not been reported previously in the Survey (I.L.C.).

BACTERIAL SPECK (Pseudomonas tomato). A large part of the fruit in one greenhouse at Leamington, Ont., were unmarketable on account of bacterial speck. It is reported that the disease has been present in the same greenhouse for the last 3 years (C.D. McKeen).

DAMPING-OFF (Pythium deBaryanum) destroyed about 20% of the seedlings in 100 flats of one grower in Lincoln Co., Ont. (G.C. Chamberlain). The disease virtually destroyed one flat in a greenhouse in Queens Co., P.E.I. (R.R. Hurst).

STEM ROT (Sclerotinia sclerotiorum). A trace was found in 2 fields of early tomatoes at Harrow, Ont. (C.D. McKeen). The same pathogen caused the rot of 3 fruit in a cluster at the Station, Kentville, N.S. (K.A. Harrison).

LEAF SPOT (Septoria Lycopersici). As in previous years, leaf spot was responsible for much defoliation in early tomato crops in Essex Co., Ont., in 1949. Many seedlings were found affected before they were set in the field. It is suspected that the pathogen survives in tomato refuse in the unsterilized compost soil used for the second transplanting (C.D. McKeen). Localized outbreaks were observed about Simcoe in Norfolk Co., and especially in Kent Co. (J.D. MacLachlan).

WILT (Verticillium albo-atrum) affected 20% of the plants in a greenhouse at Matsqui, B.C., making their removal necessary (I.C. MacSwan). Wilt was quite general in the B.C. Interior in commercial fields of tomatoes, affecting up to 50% of the plants (G.E. Woolliams).

BACTERIAL BLIGHT (Xanthomonas vesicatoria). Traces were seen in a planting in Queens Co., P.E.I., in late September (R.R. Hurst).

MOSAIC (virus) affected a few plants in a greenhouse at Haney, B.C., in Feb. and a quarter of the plants in a private garden at Chilliwack; in both instances the "fern-leaf" symptoms were common (H.N.W. Toms). Common mosaic caused slight injury to a greenhouse crop at Summerland (G.E. Woolliams). Mosaic was prevalent in many fields of canning tomatoes in Essex Co., Ont. In many instances the disease appears about 4 weeks after the plants are set in the field; the source of infection has not been determined (C.D. McKeen). Mosaic was generally light in Ont. with many areas entirely free of disease; it was less prevalent than usual (J.D. MacLachlan). About a third of 300 plants of an unknown variety were seriously stunted by mosaic in a greenhouse in Lincoln Co. A few plants were apparently affected by shoe-string mosaic; others were developing streak. Mosaic seriously affected 75% of the staked Harkness plants in a block also in Lincoln Co. (G.C. Chamberlain). Two fields, one at St. Martin and the other at St. Laurent, Que., were a total loss on account of mosaic (E. Lavallee). A trace to 2% of the plants were affected by mosaic in several fields visited in Kings Co., N.S. (K.A. Harrison).

PURPLE TOP (virus). Three plants affected by the bunch top virus (P.D.S. 27:79. 1948) were found in a plot at the Station, Fredericton, N.B. (D.J. MacLeod). A single affected plant was seen in a garden in Queens Co., P.E.I. (R.R. Hurst).

BLOSSOM-END ROT (non-parasitic). Diseased specimens from a home garden at Vananda, B.C. (I.C. MacSwan). Blossom-end rot was more common than usual in Sask., probably as a result of the hot spell of 1-8 Aug. (T.C. Vanterpool). Common in Ont., but no as severe as in 1948 (J.D. MacLachlan). This condition was confined to an area of a plantin of staked tomatoes that had received no sawdust mulch in 1948 in Lincoln Co., Ont. Where mulch was applied moisture conditions were improved sufficiently to prevent injury (G.C. Chamberlain). About 5% of the tomatoes were affected on Jesus Island, Que. (E. Lavallee). Blossom-end rot was noticed in many tomato fields in southern Que. (L. Cinq-Mars). The trouble was severe in plants transplanted in the

garden when they were in flower at Lorette, Quebec Co. (A. Payette). Blossom-end rot was affecting 40% of Stokesdale fruit picked on 8 Sept., declining to 25% in pickings made within the week in a garden at Kentville, N.S. (K.A. Harrison). The weather was such in P.E.I. that no blossom-end rot occurred (R.R. Hurst).

BLOTCHY RIPENING (non-parasitic) was very general in market gardens in Queens Co., P.E.I. (R.R. Hurst).

HORMONE INJURY. On 2 occasions tomato plants with mosaic-like symptoms, distorted and unthrifty foliage were seen in Kings Co., N.S., following application of Sure Set. It was impossible to determine the concentrations used (K.A. Harrison).

PUFFING (non-parasitic). Many fruits were found affected in one greenhouse at Leamington, Ont. The condition may have been caused by excess nitrogen during early growth of the plants (C.D. McKeen).

SKIN CRACKING (non-parasitic). Improved growing conditions in Ont. following the hot dry weather of the summer resulted in a high percentage of the fruit developing skin cracks. These cracks permitted the entrance of secondary fungi. Loss of quality was a major problem in the canning industry (J.D. MacLachlan). There were many reports of severe cracking throughout the Annapolis Valley, N.S., after a very dry July and early August followed by heavy showers in late August (K.A. Harrison). Skin cracking followed by secondary rots caused sl.-sev. losses in Queens Co., P.E.I. (R.R. Hurst).

SUNSCALD (non-parasitic) was quite prevalent in tomatoes, particularly in fields with poor foliage development in Ont. (J.D. MacLachlan). Sunscald was much more prevalent in the Montreal district, Que., than usual on account of the dry weather (E. Lavallee).

2,4,5-T INJURY caused the loss of 150' row of tomatoes near highway in a home garden on Lulu Island, B.C. The spray was carried by the wind into the garden. Stems were twisted with warty outgrowths, leaves became fern-like and fruits ceased to grow and turned hard.

TURNIP

MILDEW (Erysiphe Polygoni). A light infection was observed in a field of Laurentian in Queens Co., P.E.I., on 29 Sept. (R.R. Hurst).

STORAGE ROT (Fusarium sp. and Rhizoctonia Solani) moderately affected some bins of Laurentian in L'Islet Co., Que. Pathogenicity trials were carried out. The disease corresponds to that described by Lauritzon (Jour. Agr. Res. 33:93-108. 1929) (R.O. Lachance).

BLACK LEG (Phoma lingam) caused a 20% average loss of Swede turnips in storage in the winter of 1948-49 and 25% in the field in September in Queens and Prince Counties, P.E.I. (R.R. Hurst).

CLUB ROOT (Plasmodiophora Brassicae) affected 2% of the plants in the University seed-testing plots, Vancouver, B.C. (H.N.W. Toms). The disease caused the complete loss of crop in a field of Swede turnips at St. Flavien, Que. (A. Payette). A trace of club root was seen in a field of Laurentian in Prince Co., P.E.I. (R.R. Hurst).

MOSAIC (virus) was prevalent on turnip in the Walkerton district, Ont. (J.D. MacLachlan).

BROWN HEART (boron deficiency) followed by soft rot caused severe damage to a field of Swede turnips at St. Alban, Que. (O. Caron, R.O. Lachance). Brown heart caused slight to severe damage across P.E.I.; up to 65% of the roots were affected with an average loss of 3%. The season was dry (R.R. Hurst).

WATERCRESS

ROOT ROT (Rhizoctonia Solani). Affected plants received 24 April from a greenhouse at Islington, Ont., were stunted and yellow. Lateral roots were rotted, with an abundance of Rhizoctonia mycelium present (J.D. MacLachlan).

WATERMELON

ANTHRACNOSE (Colletotrichum lagenarium) lesions were plentiful on the stems of plants in 2 fields in the Harrow area, Ont. Considerable fruit infection was also observed later in the season in many fields (C.D. McKeen).

WILT (Fusarium bulbigenum var. niveum) was found in 2 large fields at Harrow, Ont. Some 80% of the crop was lost in one field where watermelons had not been grown for 18 years. When isolates from the 2 fields were tested for pathogenicity on 2 varieties definite differences in virulence were obtained, indicating the existence of strains of the watermelon wilt organism in southwestern Ont. (C.D. McKeen).

ROOT ROT (cause unknown) has developed in the past 2 years in plants started in cubes of steamed soil in cold frames in Essex Co., Ont. The symptoms are a stunting of the plant and yellowing of leaves combined with the rotting of all fine secondary roots, which appear a few days before transplanting to the field. Affected specimens may outgrow the condition after setting in the field provided hot weather prevails. Otherwise affected plants die in a few days. A similar disease has also been observed in muskmelons grown in a similar manner (C.D. McKeen).

IV. DISEASES OF FRUIT CROPS

A. POME FRUITS

APPLE

CROWN GALL (Agrobacterium tumefaciens). A number of seedlings planted near infected raspberry canes in York Co., N.B., were all visibly infected when lifted for transplanting (J.L. Howatt).

FIRE BLIGHT (Erwinia amylovora) was present in all varieties in the Kootenay district, B.C., especially Creston Valley, but caused significant damage only to Jonathon, Rob Roy and Wealthy. Infection was heaviest in blocks interplanted with pears (M.F. Welsh). Specimens were received from the Munro Nursery, Prince Albert, Sask., in which shoots of the root stock were attacked, but the more resistant grafted varieties remained healthy (T.C. Vanterpool). Blighted twigs of Baldwin were sent in from Wilton Grove, Middlesex Co., Ont. (G.C. Chamberlain). A specimen of twig blight was received from Haileybury (H.N. Racicot). No blight was observed in southwestern Que. (F. Godbout); but one commercial orchard at Deschambault, Portneuf Co., suffered very heavy damage (R. Desmarteau). A few trees in a garden at Kamouraska, Que., were seriously blighted (A. Payette). Specimens of infected Alexander were received from S.F. Clarkson from Jacquet River, Restigouche Co., and Tracadie, Gloucester Co., N.B.; and of McIntosh from White Settlement, Kent Co.; the organism was isolated in each instance (H.N. Racicot).

RUST (Gymnosporangium spp.). A trace of G. clavipes was found on McIntosh and Cortland in the Laboratory orchard, St. Chatharines, Ont. (G.C. Chamberlain). G. sp. (pycnia only) was collected by Dr. J.D. MacLachlan at Trenton (H.N. Racicot).

ANTHRACNOSE (Neofabraea malicorticis) was common but caused slight damage to Yellow Transparent and other varieties in the lower mainland, B.C. (I.C. MacSwan).

PERENNIAL CANKER (Neofabraea perennans) has been increasing in the Okanagan Valley, B.C., since the wide use of the newer insecticides has caused the death of the predators of the woolly aphis. The aphids were very prevalent in 1949, which indicates a heavy spread of infection in the cankers in the spring of 1950 (H.R. McLarty).

FRUIT SPOT (Phoma ?Pomorum Thüm. (syn. P. Pomi Pass. = Mycosphaerella Pomi Lindau). A 10% infection of Jonathon was found at Cambridge, Kings Co., N.S., in October (J.F. Hockey).

BLACK ROT (Physalospora obtusa) appeared to be more common than usual in Ont. as a leaf spot, and several instances of fruit rot were seen (J.D. MacLachlan). Specimens of rotted Spy were received from Port Hope (G.C. Chamberlain).

CROWN ROT (Phytophthora Cactorum). Since the recent introduction of sprinkler systems in the Okanagan Valley, B.C., a close watch has been instituted in orchards affected by crown rot. To date, the use of sprinklers has not increased the amount of the disease (H.R. McLarty).

POWDERY MILDEW (Podosphaera leucotricha) was very light in the Okanagan Valley, B.C. In some orchards in which it was very severe in 1948 only a few blighted twigs could be found. The reason for the light infection is not known, but examination of buds in the spring indicated that few were infected and that the carry-over was accordingly light (H.R. McLarty). Mildew was very heavy at Kentville, N.S., on imported scab-resistant seedlings; it was light on locally grown seedlings started in the greenhouse (J.F. Hockey).

DAMPING OFF (Pellicularia filamentosa (Rhizoctonia Solani) caused 10% loss in flats of seedlings in the greenhouse, Kentville, N.S. (J.F. Hockey).

PINK ROT (Trichothecium roseum) caused 6% loss in a scabby lot of McIntosh in Queens Co., P.E.I. (R.R. Hurst).

SCAB (Venturia inaequalis) was comparatively severe in the Salmon Arm district, B.C., especially on McIntosh, Losses in some orchards were as high as 30% of the crop. Many orchards were sprayed with the new concentrate sprayers; on the whole results were comparable to those of the conventional machines, when carefully operated by the grower (H.R. McLarty). In the Kootenay district scab was lighter than usual, although it occurred on all varieties, especially McIntosh. In the West Kootenay area unsprayed trees had about 90% scabby fruit, but in Creston Valley the figure was only about 25%. Spraying by either the conventional or the concentrate sprayers was adequate to prevent infection under the conditions prevailing in Creston Valley (M.F. Welsh). A slight infection was seen in some trees at the Station, Beaverlodge, Alta. (T.R.D.).

Scab was very mild in Ont. and was not an economic problem in most sprayed orchards. It was perhaps most prevalent in southwestern Ont. where the season was not as dry as elsewhere. A general primary infection occurred at late bloom, just before the first cover spray, but subsequent dry weather was not conducive to spread. Late scab appeared in some orchards on terminal growth, but fruit infection was insignificant. Old leaves, collected near Brighton about 15 June, contained numerous perithecia from which no ascospores had been discharged. After 15 minutes soaking, spores were shot onto traps in profusion (J.D. MacLachlan). At the Laboratory orchard, St. Catharines, infection of unsprayed McIntosh was 19% on foliage and 28% on harvested fruit. On sprayed trees infection was tr.-8% on foliage and tr.-3% on fruit. Scab was generally unimportant,

but in one small orchard in the Niagara Peninsula, through lack of timely or thorough spraying it resulted in nearly complete loss of crop. This orchard was on heavy soil and the trees were slow to develop in the spring; consequently they were highly susceptible during the important infection periods of 19-20 and 22-23 May (G.C. Chamberlain).

In 1949, ascospores in western Que. were mature early in the spring, but could not be discharged due to the lack of rain. A two-day rain on 22-23 May was the first one to permit ascospore discharge and infection. Primary scab was noticed on the foliage four weeks later, after the second cover spray, probably from the infection initiated on 23 May. This long period of incubation has been a common observation during the last few years. A few more rains occurred up to the end of June. Then the dry and very warm spell that followed during July and August completely destroyed the scab spots already established on the leaves and protected the fruit from infection, with the result that the crop was exceptionally free from scab (L. Cinq-Mars). In Missisquoi Co., calculation showed fruit infection on McIntosh to be about 1.5% in well-sprayed orchards on 22 Aug.; but considerable late infection occurred due to frequent rains in September (R. Desmarteau). At St. Denis, Kamouraska Co., severe infection of McIntosh caused killing of twigs; the pathogen was fruiting on the twigs in September (R.O. Lachance).

Widely scattered showers in May and June, followed by a hot, dry summer, greatly curbed scab development in N.B.; it was easily controlled in well-sprayed orchards. The first ascospore discharge occurred on 7 May and the first lesions were seen 13 June (J.L. Howatt). Numerous ascospores were developed by 4 May. A light to medium discharge occurred on 7 May during the pre-pink stage. From early pre-pink to the start of bloom the weather was quite dry and checked ascospore discharge. The heavy rains that occurred on 23-25 May during the bloom period made it necessary to apply a mid-bloom spray because of the heavy discharge of ascospores and favourable weather for infection. Primary infection was found on the leaves on 14 June. However, from 13 to 18 June the weather was extremely warm with maximum temperatures ranging from 90 to 97°F. The hot weather checked the growth of the apple scab fungus and, with the dry weather that prevailed during the summer, scab was controlled in the orchards. One or two apple growers suffered severe primary infection in their orchards through omitting the mid-bloom spray (S.F. Clarkson). In N.S., growth of perithecia began early in April and by 16 April collections from several orchards contained perithecia with a few mature ascospores. By the end of April spore discharges were recorded, but possible infection periods were comparatively short. Several heavy discharges occurred during May and June, but the infection periods were seldom sufficiently long to give more than a slight infection. The first primary infections were observed 1 June in unsprayed orchards. Sprayed orchards remained comparatively free from scab throughout the season, but in unsprayed orchards infection increased steadily. A young orchard, planted to winter rye in 1948, was not disked until the rye was in the firm dough stage. The unsprayed trees in this block carried less than 1% foliage scab by September. It is apparent that the spring growth of rye prevented the spores from reaching the apple foliage. The short infection periods during 1949 may have contributed to the light infection, but considerable scab occurred on trees

in a sod orchard adjoining the one planted to rye (J.F. Hockey). On McIntosh and other varieties in Queens Co., P.E.I., infection ranged from a trace to 80%; damage was often severe (R.R. Hurst).

BITTER PIT (non-parasitic). A few specimens were received from locations in Ont., particularly on Northern Spy, but less than in 1948 (J.D. MacLachlan). In the Laboratory orchard, St. Catharines, 3-5% of the fruit of Northern Spy and Cortland were affected (G.C. Chamberlain). In Kings Co., N.S., bitter pit was severe on Stark and 10-25% on Northern Spy and Baldwin. Storage pitting of Cox Orange ranged up to 60% a month after harvest (J.F. Hockey).

CHEMICAL INJURY (2,4,5-T spray). Following drifting of spray applied to the roadside at Steveston, B.C., in July, fruit of Yellow Transparent in a home garden remained on the tree until leaf-fall in October (N.S. Wright).

CROWN ROT (cause unknown). One tree each of Cortland and Delicious in a small, 15-year-old block in Niagara Twp., Lincoln Co., Ont., showed extensive crown injury and very poor growth. The location is poorly drained (G.C. Chamberlain).

DROUGHT SPOT, etc. (boron deficiency). Several affected Fameuse fruits were received from Dunham, Que. (H.N. Racicot). A lot of Wealthy from Queens Co., P.E.I., showed 2% affected fruit. The soil is very light and known to lack boron (R.R. Hurst).

ROSETTE (zinc deficiency) was detected in a limited number of orchards throughout the Okanagan Valley, B.C. Confirmatory evidence of the diagnosis was obtained (H.R. McLarty).

SCALD (physiological). Specimens of Talman Sweet were sent in from Orangeville, Ont. (G.C. Chamberlain).

PEAR

FIRE BLIGHT (Erwinia amylovora) was more serious in the Okanagan Valley, B.C., than for many years. Blossom infection was very heavy and an unusually mild fall favoured extensive late spread in the tree. Several hundred trees will have to be removed and many others heavily cut back (H.R. McLarty). Fire blight has re-appeared in many but not all the scattered pear-growing districts of the Kootenays. In Creston Valley it has been very serious for the third successive year. A contributing factor was the severe winter, which decreased the efficiency of winter pruning in many orchards (M.F. Welsh).

Fire blight was seen in an orchard in Wentworth Co., Ont., in July. A row of large Bartlett trees, alongside a block of Northern Spy apples, was affected. Damage varied from a few twig infections to almost complete death of the tree. Removal of the entire row was advised for

protection of a nearby young Bartlett orchard. The apples adjacent to the diseased pears showed blossom infection (J.D. MacLachlan). Specimens of Bartlett, with branches up to 1 in. diam. killed, were received from near Toronto. Two out of ten trees of Flemish Beauty in the Laboratory orchard, St. Catharines, were infected; one showed infection of a few large branches, and in the other infection had advanced into the trunk (G.C. Chamberlain).

EUROPEAN CANKER (Nectria galligena) caused slight damage to Bartlett in a commercial orchard at Sidney, B.C., apparently following scab infection (W. Jones).

FRUIT ROT (Phytophthora Cactorum). Since the introduction of sprinklers in the Okanagan Valley, B.C., many specimens of rotten fruit of several varieties have been sent in for examination. The fruit is found rotting on the tree. The rot was found to be due to P. Cactorum. It is not considered to be a serious disease and is confined to fruit on the lower branches (H.R. McLarty).

SCAB (Venturia pirina) caused considerable damage in a low-lying orchard with poor air drainage at Sidney, B.C. On 9 March pustules with spores were quite abundant on 1948 twigs; spores left overnight in a moist chamber showed 50% germination. Foliage and fruit became badly scabbed despite use of recommended sprays (W. Jones). Scab was general on the lower mainland (I.C. MacSwan). In spite of the dry climate pear scab persists on Flemish Beauty, where apple scab cannot, in the southern Okanagan Valley. This ability is evidently due to its habit of infecting the twigs. Such infections sporulate during blossom time and thus cause fruit infection. The disease is confined to low-lying orchards (H.R. McLarty).

Scab was severe on fruit in a small orchard at Windsor, Ont. (J.D. MacLachlan). Scab was conspicuous on the fruit of Flemish Beauty in Lincoln Co., but foliage infection was much less than usual. Overwintering twig lesions were common (G.C. Chamberlain). In a small unsprayed orchard at Ste. Anne de la Pocatière, Que., the crop was a total loss. In sprayed orchards most varieties were almost free from infection (R.O. Lachance). A very light infection occurred at Canard, N.S. (R.G. Ross). Flemish Beauty was very severely damaged in a home garden at Charlottetown, P.E.I. (R.R. Hurst).

STONY PIT (virus) affected a few trees of d'Anjou in the Laboratory orchard, St. Catharines, Ont. (G.C. Chamberlain).

BITTER PIT (cause unknown). A pitting of pears was severe in the Okanagan Valley, B.C., in 1949. The trouble is believed to be similar to bitter pit in apple. In some orchards in the Kelowna area the disease was very severe and the crop was not picked from many trees. D'Anjou was the most severely affected variety (H.R. McLarty).

BLACK END (cause unknown). This disorder again caused considerable loss in several varieties in the Okanagan Valley, B.C. Its severity fluctuates from year to year; that of 1949 was about average (H.R. McLarty).

QUINCE

RUST (Gymnosporangium clavipes) was moderately heavy on quince at Brighton, Ont. (H.N. Racicot, J.A. Parmelee). It was moderately heavy at the Experimental Station, Kentville, N.S. (C.O. Gourley).

BLACK ROT (Physalospora obtusa). A few infected fruits were seen at Clarence, Annapolis Co., N.S. (J.F. Hockey).

B. STONE FRUITS

APRICOT

CORYNEUM BLIGHT (Clasterosporium carpophilum). Spotted fruits were received from Lillooet and leaves from a garden at North Vancouver, B.C. (H.N.W. Toms). Coryneum blight caused slight damage in the Okanagan Valley compared with 1948. In many orchards it caused no damage and in most others damage was slight. The weather was dry from swelling of the buds until after fruit-set (H.R. McLarty). In the Kootenays infection was moderate on unsprayed trees; but most growers have adopted the recommended spray programme, which controls the disease (M.F. Welsh).

FRUIT ROT and TWIG BLIGHT (Phytophthora Cactorum). One orchard in the Okanagan Valley, B.C., in which sprinklers were used, suffered severely from fruit rot and twig and branch blight. This orchard is on a steep slope. Water from the sprinklers drenched the entire trees. P. Cactorum was isolated and proved by inoculation to be the pathogen (H.R. McLarty).

CHERRY

SCAB (Cladosporium carpophilum) was general on a few sweet cherry trees at Brentwood, B.C. (E.R. Hall, W. Jones).

BLACK KNOT (Dibotryon morbosum). A specimen was received from Hollyrood, Ont. (J.D. MacLachlan). A large branch of, probably, choke cherry was received from Mayo, near Buckingham, Que., bearing many large knots and with almost all twig tips swollen from recent infection (H.N. Racicot). Black knot was severe at Souris, Kings Co., P.E.I., with three enquiries received (D. Robinson), and heavily infected specimens were brought in from Queens Co. (R.R. Hurst).

SHOT HOLE (Higginsia hiemalis) was severe and defoliation moderate on young cherry trees in several nurseries in the lower mainland, B.C. Infection in mature orchards was negligible in comparison with 1948 (I.C. MacSwan). Infection was very light, and confined to leaves, on all varieties in the Kootenays (M.F. Welsh). Shot hole was of no importance in 1949 in the Niagara Peninsula, Ont. A moderate development late in the season in the Fonthill district caused premature defoliation (G.C. Chamberlain).

POWDERY MILDEW (Podosphaera Oxyacanthae). A specimen was received from Thornberry, Ont., and heavy infection of a wild cherry was seen near Guelph (J.D. MacLachlan).

BROWN ROT (Sclerotinia fructicola and S. laxa) was severe on all varieties in the West Kootenay district, B.C., where partial or complete loss of crop resulted from failure to apply the cover sprays, but was light in Creston Valley (M.F. Welsh). A trace only of blossom blight (S. fructicola) occurred in the Niagara Peninsula, Ont. The bloom period was short, with fair weather and high temperature (G.C. Chamberlain). At the Experimental Station, Kentville, N.S., S. fructicola caused severe killing back of new growth of sour cherries, especially Morello and Montmorency (C.O. Gourley).

WITCHES' BROOM (Taphrina Cerasi) affected the leaves of a single sweet cherry twig in the University orchard, Point Grey, B.C. (R.E. Fitzpatrick). A specimen showing leaf curl, but no witches' broom, was collected 16 May at Penticton by R.P. Murray on sweet cherry. The specimen was identified by Dr. Anna E. Jenkins, following A.J. Mix's recent monograph of the genus (Univ. Kans. Sci. Bull. 33, pt. 1, 167 pp. 1949) in which T. Cerasi and T. minor are combined (I.L.C.).

LITTLE CHERRY (virus). None was found in the survey of 45,000 cherry trees in the Okanagan Valley, B.C., conducted by the Provincial Dept. of Agriculture (T.B. Lott). In the Kootenays it is becoming increasingly obvious that the symptoms of little cherry vary significantly from district to district. There are now only a few orchards in the extreme western limits of the Kootenays in which the disease has not appeared (M.F. Welsh).

NECROTIC RING SPOT (virus) was found in 9 of the 21 sour cherry orchards inspected in the Niagara Peninsula, Ont. Total infection was 1.6% of trees. In the affected orchards infection ranged from 0.2 to 12.0%, av. 3.2%. Of the 1.6% visibly diseased trees, 0.9% showed necrotic spotting, 0.5% necrotic spotting and shock symptoms, and 0.2% etch symptoms. Shock symptoms were found in 5 orchards, in 3 of which 5% of the trees showed this symptom, indicating active spread of the virus (G.C. Chamberlain).

RUGOSE MOSAIC (?virus). The disease affecting 6 trees of Lambert at Erickson, B.C., previously ascribed to a form of rasp leaf (P.D.S. 27:89. 1948, and 28:79. 1949) is considered by Dr. L.C. Cochran, U.S.D.A., as more closely allied to rugose mosaic. The trouble is still confined to 6 trees and spread within the individual trees is slow (M.F. Welsh).

SMALL BITTER CHERRY (virus) continues to spread slowly in Bing and Lambert sweet cherries in the southern Okanagan Valley, B.C. A tree inoculated in 1941 finally showed the disease in 1949, providing some confirmation of the virus nature of the disease (T.B. Lott).

TATTER LEAF (virus) was present in 19 of 22 sweet cherry orchards surveyed in the Niagara Peninsula, Ont., and affected 5.7% of the trees. Infection ranged from 1 to 31%, av. 7.5%, in affected orchards. Most commercial varieties were affected. Symptoms were usually confined to a few branches (G.C. Chamberlain).

YELLOWS (virus) was present in all 21 orchards, comprising 4929 trees, of sour cherry surveyed in the Niagara Peninsula, Ont. Infection ranged from 2 to 53%, av. 17%. Leaf fall and yellowing were less severe than usual, and the period of symptom expression was both late and short. Temperatures were high during the early bloom period. Trees that showed green ring patterns suffered heavier defoliation than those that did not (G.C. Chamberlain).

CRINKLE (bud sport) was present in 18 of 22 sweet cherry orchards surveyed in the Niagara Peninsula, Ont., affecting 3.2% of the 2849 trees. Infection ranged from 1 to 17% in affected orchards, av. 4.7%. Black Eagle is frequently affected. Affected trees are unproductive (G.C. Chamberlain).

MOTTLE (cause unknown) was present in 21 of 22 sweet cherry orchards surveyed in the Niagara Peninsula, Ont., ranging from 3 to 52%, av. 21%, in affected orchards. Various types and degrees of mottling, sometimes with definite ring or blotch patterns, were seen, but the cause or causes are not known (G.C. Chamberlain).

NECROTIC SPOTTING (cause unknown) was seen in 17 of 22 sweet cherry orchards surveyed in the Niagara Peninsula, Ont., ranging from 1 to 9%, av. 1.9% (G.C. Chamberlain).

PEACH

SCAB (Cladosporium carpophilum). A specimen was received from Toronto, Ont. (J.D. MacLachlan).

CORYNEUM BLIGHT (Clasterosporium carpophilum) was moderately heavy, causing slight damage, on all varieties, especially Rochester, in unsprayed orchards in the Kootenays, B.C. In most of the seriously affected orchards the disease is now satisfactorily controlled by the recommended spray programme (M.F. Welsh).

LEAK (Rhizopus nigricans). Light to moderate infections were seen on local and Ontario peaches on the market at Kentville, N.S. (J.F. Hockey).

BROWN ROT (Sclerotinia fructicola). In contrast with 1948, brown rot caused no loss in the Okanagan Valley, B.C., in 1949, and not a single case of its occurrence was reported. The normal, dry summer weather does not permit development of the pathogen (H.R. McLarty). Specimens were received from Brantford, Ont. Less reported than in most years (J.D. MacLachlan). Brown rot was of minor importance in the Niagara Peninsula. Fair weather during bloom curbed blossom blight and prolonged dry weather through the summer and harvest period prevented fruit infection. Some loss occurred late in the season where fruit was held beyond the firm-ripe stage (G.C. Chamberlain).

LEAF CURL (Taphrina deformans) was general in the lower Fraser Valley and Vancouver areas, B.C. Some unsprayed trees were severely affected (R.E. Fitzpatrick, I.C. MacSwan). Little leaf curl developed in the Okanagan Valley. In some experimental plots infection in the checks was insufficient to allow evaluation of fungicides (H.R. McLarty). Infection was moderate in the West Kootenays and light in Creston Valley (M.F. Welsh). Specimens were received from Iona Station, Wallaceburg, Port Elgin, and Clinton, Ont. (J.D. MacLachlan). A trace occurred on one tree in the orchard at the Experimental Station, Kentville, N.S., and a few specimens were brought in from the district (C.O. Gourley).

CANKER (Valsa spp.). Cankers developed at many points along the smaller branches of trees in several orchards in Essex Co., Ont. V. ?leucostoma was isolated from several lesions (C.D. McKeen). Every tree in a 4-year-old block of 50 Red Hanen in Lincoln Co. showed one to several extensive crotch or trunk cankers in March. The variety seems to be very susceptible. One- and two-year-old trees in a nursery in Lincoln Co. bore trunk cankers in May, resulting from the removal of laterals and also, perhaps, from imperfect ripening in the fall of 1948 (G.C. Chamberlain).

WESTERN X DISEASE (virus) continues to spread slowly in the orchards that were first mapped in 1940 in the Okanagan Valley, B.C. Six new infections were found in 2278 trees in the southern districts. Symptoms were evident in 51 trees that had shown them at some previous time, and were lacking in 28 that had previously shown them (T.B. Lott).

X DISEASE (virus). Scattered infected trees of Fischer and Elberta were found in one area of Niagara Twp., Lincoln Co., Ont. Choke-cherries were found within a mile of the infected trees (G.C. Chamberlain).

FERTILIZER INJURY (excess nitrogen) caused leaf yellowing and marginal burning of 6-year-old Elberta and Vedette in Lincoln Co., Ont. The yellowed leaves fell prematurely. Cyanamid was applied in the spring at 2-3 lb. per tree (G.C. Chamberlain).

SPRAY INJURY. Two and a half rows of trees in a large block of Elberta in Lincoln Co., Ont., showed leaf spotting and defoliation due to residue of Bordeaux mixture being left in the tank after grapes were sprayed. Similar injury was seen in a second orchard in which the sprayer had previously been used to apply Bordeaux mixture to pears (G.C. Chamberlain).

PLUM

SCAB (Cladosporium carpophilum) was severe on fruit received from Pointe aux Trembles, Laval Co., Que. (H.N. Racicot).

CORYNEUM BLIGHT (Clasterosporium carpophilum) caused severe defoliation of Italian prune in several scattered orchards in the Kootenays, B.C. (M.F. Welsh).

BLACK KNOT (Dibotryon morbosum). Infection was light in a neglected orchard at North Saanich, B.C. Specimens of Damson plum were sent in from Duncan (W. Jones). Specimens were received from home gardens at Toronto, Plattsville, Walkerton and Mono Road, Ont. (J.D. MacLachlan). Infection was moderate and damage slight at the Experimental Station, Kentville, N.S. (C.O. Gourley). Black knot severely damaged several trees in a neglected orchard in Queens Co., P.E.I. (R.R. Hurst).

BROWN ROT (Sclerotinia fructicola) was common on plum and prune fruit at harvest in the lower mainland, B.C., but the loss was slight (I.C. MacSwan). Specimens were received from Essex, Point Edward, and Tilbury, Ont. (J.D. MacLachlan). A trace was seen on Victoria in Queens Co., P.E.I. (R.R. Hurst).

PLUM POCKET (Taphrina communis). Specimens were received from Carnarvon and Devlin, Ont. (J.D. MacLachlan). Damage was severe in a planting in Kings Co., P.E.I., and a trace was recorded on a single tree of Victoria in Queens Co. (R.R. Hurst).

WILT (Verticillium sp.) attacked 10/200 3-year-old trees of Early Golden and Reine Claude at Port Dalhousie, Ont., causing partial defoliation (G.C. Chamberlain).

SHOT HOLE (?Xanthomonas pruni) caused heavy defoliation of oriental plums at the Station, Kentville, N.S. The disease, which appears to be bacterial, is under investigation (C.O. Gourley).

SHIRO LINE-PATTERN MOSAIC (virus). Symptoms appeared on Mammoth oriental plum at the Station, Kentville, N.S., about 10 June, but were completely masked by the end of July (C.O. Gourley).

DIE BACK (boron deficiency) was again present in some orchards in the Okanagan Valley, B.C. Some of the affected orchards had received ample boric acid, but the symptoms were typical of boron deficiency. The matter is being investigated (H.R. McLarty).

HEAT SPOT (physiological) was prevalent in orchards of Italian Prune on heavy soil in Lincoln Co., Ont., after high temperatures in July. Water-soaked spots developed on the fruit, which later dropped (G.C. Chamberlain).

SCORCH (potash deficiency). Trees of Reine Claude in a low area of an orchard at Port Dalhousie, Ont., showed extensive marginal scorch. The trees had received a heavy application of nitrogen (G.C. Chamberlain).

SHOT HOLE (cause unknown). Severely affected leaves were received from Marieville, Que., but as all the lesions had abscissed the caused remained uncertain (H.N. Racicot).

WILT (cause unknown) was severe in a tree in Queens Co., P.E.I. The pathogen had evidently entered through a wound on the trunk and had blackened the conductive tissue (R.R. Hurst).

C. RIBES FRUITS

CURRANT

WHITE PINE BLISTER RUST (Cronartium ribicola) was heavy and caused slight defoliation of black currant in the University plots, Point Grey, B.C. (H.N.W. Toms). It was common about Guelph, Ont., in late summer, often causing complete defoliation of susceptible varieties of black currant before the end of September. A specimen was received from Freeman (J.D. MacLachlan). It was commonly found in black currant nursery plantings at Fenwick, Smithville, Port Burwell and Hamilton. It was also troublesome in commercial plantings especially of Boskoop Giant and Black Giant (G.C. Chamberlain). A trace occurred on Black Naples at the Station, Ste. Anne de la Pocatière, Que. (A. Payette). Rust was trace to heavy, av. 75% of leaves infected, on black currants in Queens Co., P.E.I. Red currant was also infected (R.R. Hurst).

ANTHRACNOSE (Drepanopeziza Ribis) was moderately heavy and caused some defoliation of red currant at the Station, Kentville, N.S. (C.O. Gourley).

SEPTORIA LEAF SPOT (Mycosphaerella Grossulariae) was moderately heavy at the Station, Kentville, N.S., and caused some defoliation (C.O. Gourley).

DOWNY MILDEW (Plasmopara ribicola) was moderately heavy on swamp black currant, Ribes triste, in a shady situation at Moose Factory, Ont., at the south end of James Bay. The only previous record of the fungus in Canada is from Beeton, Ont., on cultivated gooseberry (P.D.S. 25:96. 1946). (D.B.O. Savile).

POWDERY MILDEW (Sphaerotheca mors-uvae). Infection was about 50% on the rust-resistant black currants at Agassiz, B.C. (H.N.W. Toms). Infection was heavy on black currants at the Station, Beaverlodge, Alta., and light in garden plantings at Edmonton (T.R.D.). Mildew was moderately heavy on Crusader and Coronet rust-resistant black currants at Ste. Anne de la Pocatière, Que. (A. Payette).

GOOSEBERRY

WHITE PINE BLISTER RUST (Cronartium ribicola) was light on gooseberries at Charlottetown, P.E.I. (R.R. Hurst).

ANTHRACNOSE (Drepanopeziza Ribis) was moderately heavy on gooseberries and caused some defoliation at the Station, Kentville, N.S. (C.O. Gourley).

SEPTORIA LEAF SPOT (Mycosphaerella Grossulariae) was moderately heavy and caused some defoliation at the Station, Kentville, N.S. (C.O. Gourley). Infection varied from trace to moderately heavy in Queens Co., P.E.I. (R.R. Hurst).

D. RUBUS FRUITS

BLACKBERRY

ORANGE RUST (Gymnoconia Peckiana). A specimen was received from Port Dover, Ont., in June (J.D. MacLachlan).

CROWN GALL (Agrobacterium rubi (Hildebrand) Starr & Weiss). Considerable increase in gall growth occurred on second-year growth of R. procerus at Keating, B.C., infected with A. rubi, reported in P.D.S. 28:86 as A. tumefaciens (W. Jones). It has been the practice to report all crown gall in the Survey under A. tumefaciens pending clarification of host relationships. This policy will be continued except when definite evidence has been provided that A. rubi is involved (D.B.O.S.).

BOYSENBERRY

CROWN GALL (Agrobacterium tumefaciens) was present on two plants in the University plots, Point Grey, B.C. (H.N.W. Toms).

LOGANBERRY

CANE BLIGHT (Leptosphaeria Coniothyrium) caused considerable damage to fruiting canes of R. macropetalus X R. loganobaccus in a commercial planting at Duncan, B.C. (W. Jones).

SEPTORIA LEAF SPOT (Mycosphaerella Rubi) was general on foliage and canes in the Saanich Peninsula, B.C., but lighter than in 1948 (W. Jones).

RASPBERRY

CROWN GALL (Agrobacterium tumefaciens) was found in nursery plantings of Latham in Middlesex and Welland Co., Ont., during roguing. Failure of newly planted Latham canes to become established at Wallaceburg was also attributed to crown gall (G.C. Chamberlain). In a plantation at McDonalds Corner, N.B., all plants of 12 varieties showed trace to heavy infection (W.A. Hodgson, H. Lawrence). Crown gall caused severe injury to 5% of the canes in a Viking plantation in Queens Co., P.E.I., and enquiries were received from four other sources (R.R. Hurst).

SPUR BLIGHT (Didymella applanata). A trace was seen in plantings at Edmonton, Alta. (T.R.D.) Spur blight was trace to very heavy, av. 7%, in plantings of Latham and Viking throughout P.E.I. (R.R. Hurst).

ANTHRACNOSE (Elsinoe veneta) was generally of minor importance in commercial plantings in Ont. In a varietal test at Vineland the percentage of infected canes on 7 July was as follows: Chief 2, Cuthbert 0, Gatineau 16, Herbert 15, Latham 0, Lloyd George 24, Madawaska 21, xMarci 65, Milton 10, Newburg 0, Ottawa 1, xRideau 80, Taylor 36, xTrent 81, Viking 3, xWashington 68. The varieties marked with an asterisk bore relatively few lesions per cane and the figures accordingly do not truly indicate the degree of infection. In specimens of Trent sent in from Barrie anthracnose had caused death of the cane tips (G.C. Chamberlain). In a planting of Cuthbert at Alma, Prince Co., P.E.I., infection was 100% and damage moderate on 10 July (D. Robinson). Elsewhere, on Viking, it was trace to severe but generally trace (R.R. Hurst).

YELLOW RUST (Phragmidium Rubi-idaei) was light on Washington at Duncan, B.C. (W. Jones). In the lower Fraser Valley and Vancouver areas infection on Cuthbert and Washington was light. At Point Grey basidia were seen on 11 April, aecia on 5 May and uredinia on 21 June (H.N.W. Toms).

LATE YELLOW RUST (Pucciniastrum americanum) caused moderate scorch and leaf fall of Viking in a nursery planting at Fenwick, Ont. (G.C. Chamberlain).

POWDERY MILDEW (Sphaerotheca Humuli). Infection was light in plantings at Lacombe and Beaverlodge, Alta. (T.R.D.). It was commonly seen on Latham and occasionally on other varieties in Ont. In a young planting of Bristol in Wentworth Co. infection was general on 8 July; the cane tips were infected and of little use for layering (G.C. Chamberlain).

WILT (Verticillium albo-atrum). Specimens of Chief were received from Moose Range, Sask., and of Viking from Woodstock, Ont. (G.C. Chamberlain).

LEAF CURL (virus). Severely stunted specimens of Golden Queen yellow raspberry were received from Moose Range, Sask. Infection was 1% in a young planting of a Newburg X Cuthbert seedling at St. Catharines, Ont., and it was also seen on a few plants of Viking (G.C. Chamberlain). Specimens were received from Kenogami, Chicoutimi Co., and St. Troy, Quebec Co., Que. (H.N. Racicot). A single infected plant of Viking was seen in Queens Co., P.E.I. (R.R. Hurst).

MOSAIC (virus). Infection was moderate in some varieties at the Station, Beaverlodge, Alta., and a trace at Lacombe (T.R.D.). A trace to 8% occurred in 15/100 propagative plantings examined in southern Ont. It was found in Cuthbert, Latham, Taylor and Viking, mainly in Middlesex, Elgin, Norfolk and Wentworth Counties. Four per cent occurred in Newburgh X Cuthbert seedlings at St. Catharines (G.C. Chamberlain). Infection was nearly 100% in a garden planting of Viking at Truro, N.S. (R.G. Ross). At Charlottetown, P.E.I., infection was Viking trace, Cuthbert 15%, and Latham, Lloyd George and Newburg 25%. Fruit from infected canes was small, dry and tasteless (R.R. Hurst).

CHEMICAL INJURY (2,4,5-T spray). Following drift from roadside spraying at Steveston, B.C., in July, raspberry fruits coloured but remained hard and did not ripen (N.S. Wright).

WINTER INJURY caused 15% loss in a Viking plantation in Queens Co., P.E.I. The planting received a heavy fertilizer application late in the summer of 1948 and the canes continued to grow late into the fall (R.R. Hurst).

E. OTHER FRUITS

BLUEBERRY

CANKER (Godronia Cassandrae) caused slight damage in a garden at Brentwood, B.C. (W. Jones), and was general in the Surrey and Lulu Island districts on high bush blueberry (R.E. Fitzpatrick).

GRAPE

DEAD ARM (Fusicoccum viticola) was serious in a large Concord vineyard in Lincoln Co., Ont. A close check in one part showed 11.2% of vines affected and 13% removed prematurely because of the disease. Dead arm is widespread in the Niagara Peninsula (G.C. Chamberlain).

DOWNY MILDEW (Plasmopara viticola) was unimportant in 1949 in the Niagara Peninsula, Ont. Scattered infections were seen on Agawam and Delaware foliage. Only a trace was seen on unsprayed vines of the highly susceptible Fredonia (G.C. Chamberlain). A specimen was received from Aylmer, Que. (H.N. Racicot).

POWDERY MILDEW (Uncinula necator) was light in a garden at Sumas, B.C. (W. Jones). Foliage infection was common on Concord in Lincoln Co., Ont., following fall rains, but developed too late to cause appreciable damage (G.C. Chamberlain).

CHEMICAL INJURY (2,4-D spray). Small, malformed foliage was found scattered throughout a Concord vineyard in Welland Co., Ont., following roadside spraying with an ester of 2,4-D. In one area there was a marked delay in maturing of fruit and a lack of terminal growth (G.C. Chamberlain).

CHLOROSIS (?iron and manganese deficiency). Many vineyards of Concord and Worden in the Niagara Peninsula, Ont., showed marked yellowing following prolonged drought and heat. Affected vines made weak growth and yielded poorly. A mild chlorosis of Concord, suggested by Dr. du Plessis of Stellenboch, South Africa, as perhaps due to manganese deficiency, was also seen (G.C. Chamberlain).

FROST INJURY. Up to 90% of new growth of Concord was killed in localized areas of the eastern Niagara Peninsula, Ont., by frost on the night of 9 May. The overall damage in the area was about 10% (G.C. Chamberlain).

LEAF SCORCH (potash deficiency). Unthrifty growth and abundant leaf scorch of Fredonia and Concord in Lincoln Co., Ont., was attributed to lack of potash (G.C. Chamberlain).

STRAWBERRY

GREY MOULD (Botrytis cinerea) affected 1% of Senator Dunlap at Alberton, P.E.I. (D. Robinson).

LEAF BLIGHT (Dendrophoma obscurans) became prevalent in Ont. after the crop was harvested, and its incidence increased towards autumn. Some plots of Senator Dunlap in the Ottawa district were severely affected. Premier was also severely attacked, no plot being found free from disease in the districts surveyed (see under scorch). The pycnidia of the fungus are seen as dark dots on the light brown lesions. The fungus was also found on Fragaria vesca and F. virginiana near Ottawa (Joan E. Fall).

LEAF SCORCH (Diplocarpon Earliana). Varietal resistance to scorch was evident from surveys in the Ottawa, Vineland, St. Catharines, Oakville and Waterford districts, Ont., during the seasons of 1948 and 1949. Catskill, Crimson Glow, Culver, Dresden, King, Premier, and Tupper showed very high resistance to the disease. A few scorch lesions were found on Borden, July Morn, Mackenzie, Massey, Maytime, and Senator Dunlap. Louise, Robinson, Sparkle, Temple and Valentine showed a moderate amount of disease. Heavy infection occurred on Fairpeake and Redwing. Scorch became prevalent in early summer and increased in severity during the warmer months (Joan E. Fall). At Charlottetown, P.E.I., scorch incidence was as follows: none -- Borden, Crimson Glow, Dresden, Herman, King, Maytime, Premier, and Valentine; trace -- Catskill, Culver, Mackenzie, Massey, Senator Dunlap and Tupper; moderate -- July Morn, and Louise; severe -- Redwing (R.R. Hurst, V. Clark).

LEAF BLOTCH (Gnomonia Fragariae Kleb. var. fructicola Arn. (Zythia Fragariae Laibach). The pathogen was isolated from leaves thought to be affected with Dendrophorna obscurans. The pycnidia of the Zythia, however, are much lighter in colour than those of the blight fungus. The perfect or Gnomonia stage was found on overwintered strawberry leaves collected near Ottawa. The fungus seems to occur in association with D. obscurans. The degree of its pathogenicity and the economic importance of the disease are under investigation. The name 'Leaf Blotch' was proposed by H. Wormald (Gardeners' Chronicle 28 Oct. 1944) for what appears to be this disease. Alexopoulos and Cation (Phytopath. 38: 698-706. 1948) report a fungus causing a stem-end rot of strawberry fruit which they consider to be the perfect stage of D. obscurans. Their fungus, however, resembles closely Gnomonia Fragariae. Their account seems to be the only previous reference to it in North America (Joan E. Fall).

ROOT KNOT (Heterodera marioni). A patchy infection occurred in old plants in a neglected bed at Point Grey, Vancouver, B.C. (H.N.W. Toms).

LEAF SPOT (Mycosphaerella Fragariae) was common in the Guelph district, Ont. A ¼-acre field at Bayfield showed slight damage on 16 July (J.D. MacLachlan). Surveys of the Ottawa, St. Catharines, Vineland, Oakville, and Waterford districts, Ont., during the seasons of 1948 and 1949 indicated a striking range in the incidence of leaf spot on strawberry varieties. Catskill, July Morn, Maytime and Premier showed very high field resistance. Resistance was also shown by the following varieties, although leaves bearing a few spots could be found: Borden, British Sovereign, Culver, Dresden, Fairfax, Massey, Redwing and Temple. The varieties King, Mackenzie, Senator Dunlap and Valentine were considerably spotted. In some cases Senator Dunlap plants were very severely attacked. Louise was found to be severely spotted in each district during the entire growing season. On the whole the disease incidence varied seasonally, spots being most abundant in the spring and in the late summer and fall (Joan E. Fall). A survey at the Station, Charlottetown, P.E.I., gave the following incidence of leaf spot: none -- Catskill, Dresden, July Morn, Mackenzie, Massey, Maytime, Premier, Redwing, and Valentine; trace -- Borden, Culver, King, and Senator Dunlap; moderate -- Herman; severe -- Louise (R.R. Hurst). It is interesting to note that although Valentine, Mackenzie, King and Senator Dunlap were considerably spotted in Ontario, these varieties were free or almost free from disease in P.E.I. (Joan E. Fall). It is to be hoped that detailed data of the incidence of each of the foliage diseases of strawberry will in future be recorded in varietal test plots in other regions. Miss Fall's success in clearing up the confusion between the several diseases involved with greatly simplify the collection of such records. The accumulation of data from all parts of Canada will help to indicate whether biologic specialization exists in any of the pathogens, and will make it possible for breeders to tackle the problem of disease resistance in a more rational manner (D.B.O.S.). Examination of phanerogamic specimens collected in 1949 yielded Mycosphaerella Fragariae, or Ramularia Tulasnei, on Fragaria glauca from the neighbourhood of Dawson, Mayo, Watson Lake and Whitehorse, Yukon; and on F. virginiana from Moose Factory, Ont., and Stephenville, Nfld. It is conceivable that the F. virginiana records represent introductions of the parasite, but it seems clear that it must be endemic in Yukon on F. glauca (Joan E. Fall, D.B.O. Savile).

RED STELE (Phytophthora Fragariae) was found, for the first time in N.B., near Memramcook on 10 June. A few specimens were received from Kings, Colchester and Yarmouth Co., N.S. (J.F. Hockey).

POWDERY MILDEW (Sphaerotheca Humuli) was general on some hybrids at the Station, Saanichton, B.C., causing considerable damage. It was slight on British Sovereign (W. Jones). Powdery mildew was general in the lower Fraser Valley; it caused blotching of British Sovereign foliage, but the damage was generally negligible (R.E. Fitzpatrick). It caused slight injury in the Ottawa district, Ont. (Joan E. Fall). Infection was less than 5% on Senator Dunlap and damage slight at Charlottetown, P.E.I. (D. Robinson).

MILD MOSAIC (virus) was found in 3 plantations of Senator Dunlap in Sunbury Co., N.B. Infection was trace to 3% (D.J. MacLeod).

YELLOWS (virus). All plantings of Marshall in the lower mainland, B.C., seem to be affected; the damage is severe (R.E. Fitzpatrick). Yellows was severe on Marshall in a laboratory plot at Fredericton, N.B., and was found in Catskill and 5 seedlings at the Substation, McDonald's Corner (D.J. MacLeod).

JUNE YELLOWS (genetic breakdown). A specimen was received from Owen Sound, Ont., on 4 June (J.D. MacLachlan). June yellows was quite common in the Niagara Peninsula. It caused yellowing and stunting in scattered areas of several second year plantings of Premier examined on 9 May in Louth Twp., Lincoln Co.; none was seen in adjacent rows of Valentine and Fairfax (G.C. Chamberlain).

ROOT ROT (cause unknown). Failure of plantings examined at Weyburn (1 June), Saskatoon (10 June) and Broomhead (13 July), Sask., was apparently due to a combination of root rot and winter injury (T.C. Vanterpool). Specimens affected with root rot were received from Little Currant, Grand Valley, Paris, Thorndale, Woodstock, Cooksville and Wallenstein, Ont. (J.D. MacLachlan). In a 3-year-old planting of Premier in Lincoln Co. about half the plants were stunted and dying; they had been mulched with sawdust. Root rot was serious in a new planting of Premier at Port Dalhousie; 10-15% of the plants were dead or dying in some areas in July (G.C. Chamberlain). Root rot was prevalent in the Ottawa district. A crown rot and lesions at the base of the petioles were associated in most cases with the blackened roots. In one plot it was noted that first the parent plant died, and then all its runner plants died even though they had become established. All three symptoms were present. Attempts to find a pathogen yielded no conclusive evidence (Joan E. Fall). Infection was moderate to severe in nearly all variety plots at the Station, Ste. Anne de la Pocatière, Que. (R.O. Lachance). In a severely affected planting of Senator Dunlap at Milton, P.E.I., examined in May, many soil organisms were isolated from rotted areas of the roots. In a slightly damaged planting of the same variety at Charlottetown, examined 7 June, additional symptoms included severely affected plants that were taller than normal and had red-coloured crowns. Organisms isolated included Mucor, Sclerotinia, Fusarium and two undetermined Phycomycetes (D. Robinson).

V. DISEASES OF TREES AND SHRUBS

ABIES - Fir

Needle Blight (Hypodermella nervata Darker) was heavy on small trees of A. balsamea and trace to moderate on large ones near Stapleton, Carleton Co., Ont., 25 May (D.B.O. Savile).

Witches' Broom (Melampsorella Cerastii). A single large broom was seen on A. balsamea at Moose Factory, Ont. (D.B.O. Savile).

Timber Rot. Preliminary investigations in northern N.B. indicate that Stereum sanguinolentum is responsible for much of the decay of A. balsamea, although Corticium galactinum, Polyporus balsameus and Poria subacida also cause important losses (V.J. Nordin).

ACER - Maple

Anthracnose (Gloeosporium apocryptum) occurred on leaves of soft maple (?A. saccharinum) at Montreal, Que. (J.E. Jacques).

Twig Blight (Nectria cinnabarina). A specimen was received from Windsor, N.S. (J.F. Hockey).

Tar Spot (Rhytisma spp.). R. acerinum was light on soft maple at St. Vincent de Paul, near Montreal, Que., in July. A plantation of A. rubrum was heavily attacked at Ste. Anne de la Pocatiere, Que., as it has been regularly for some years (A. Payette). R. punctatum was prevalent on A. macrophyllum at Thetis L., near Victoria, B.C., and at Stanley Park and Point Grey, Vancouver (H.N.W. Toms).

Heat Injury. Following the hot spell of 1-8 Aug. in Sask., new growth of A. Negundo showed mottling, chlorosis and distortion, due to marginal injury, of the leaves. Affected twigs only occasionally showed normal growth late in the season. This trouble was seen at Saskatoon and Smeaton and specimens were sent in from Humboldt and Moose Jaw (T.C. Vanterpool).

AESCULUS - Horsechestnut

Leaf Blight (Guignardia Aesculi) was rather heavy in the vicinity of Charlottetown, P.E.I. It is possible that the weakening effect of yearly attacks by this pathogen may have been partly responsible for the destruction by wood-destroying fungi of many fine horsechestnuts that used to grace Charlottetown (R.R. Hurst).

AMELANCHIER

Black Leaf Curl (Apiosporina Collinsii) was very prevalent and appears to be spreading in the Edmonton district, Alta. (L.E. Tyner).

BETULA - Birch

Timber Rot (Poria obliqua). A heart rot of western white birch (B. papyrifera var. commutata) in B.C. was found to be associated with Poria obliqua. Large, black, clinker-like, sterile sporophores were found issuing from knots on the main stem of pole-sized trees. The fungus was associated with stem cankers and also was found to be capable of killing sapwood and causing a heart rot almost identical with that due to Fomes igniarius (R.E. Foster).

Die-Back (cause unknown) is now ubiquitous in the Maritime Provinces. In N.B. most commercial stands are of little commercial value, due to excessive die-back mortality. The disease is equally serious in Cumberland and Colchester Counties, N.S., and in other parts of that province it threatens to eliminate birch as a competitive commercial hardwood species. The disease is less conspicuous in the hardwood stands of Cape Breton Island; however, here as elsewhere in N.S. the mortality and degree of injury appear to be increasing steadily. It has now been established that initial symptoms develop in the absence of activity by the bronze birch borer, Agrilus anxius although the insect is undoubtedly important in hastening the death of weakened trees.

Considerable speculation has resulted as to the factor or combination of factors that may be responsible for this initial decline in birch. Some of the possible factors that have been suggested are as follows: Sub-normal precipitation; excessive opening of stands from logging practices, death of associated hardwood species such as beech, repeated infestations by various insects; a combination of the foregoing factors; virus; fungus. Foresters of the Nova Scotia Department of Lands and Forests are concentrating their efforts on ecological and physiological phases of the problem. The possibility that a virus or group of viruses may be involved is being investigated by United States pathologists attached to the Division of Forest Pathology, New Haven, Conn. The pathogenicity of any of a number of fungi has not yet been established. This phase of the problem is receiving the attention of the staff of the Dominion Laboratory of Forest Pathology, Fredericton, N.B. (V.J. Nordin). Except for young trees, white birch free from die-back are now seldom seen in Queens Co., P.E.I. (R.R. Hurst).

CORYLUS - Filbert

Catkin Deformation (cause unknown). Material was brought in to the Laboratory in August from a garden at Vancouver, B.C., in which the staminate catkins were greatly deformed and swollen into a clavate shape. A detailed examination failed to reveal any fungus. A similar condition was seen in the University orchard plots in Aug. 1947. Some deformed catkins shed pollen in November, but others failed to mature pollen and dropped off during the winter (H.N.W. Toms).

COTONEASTER

Dark Berry (Phytophthora Cactorum) was general on fruit of C. horizontalis at the Station, Saanichton, B.C. Affected fruits contained much mycelium and a few oospores (W. Jones).

Rust (Gymnosporangium clavipes). Fruits of C. acutifolia bearing pycnia of this rust were collected at Morden, Man., by A.M. Brown on 23 June, and aecia were taken at the same location by T. Johnson on 5 July. This appears to be the first report of a Gymnosporangium on Cotoneaster in North America, but several other species attack the genus in Europe and Asia (I.L. Conners).

CRATAEGUS - Hawthorn

Rust (Gymnosporangium clavariaeforme) was heavy on C. Oxyacantha in two gardens at Courtenay, B.C. (W. Jones, I.L. Connors).

FRAXINUS - Ash

Powdery Mildew (Phyllactinia corylea). A large tree of F. pennsylvanica near Guelph, Ont., had almost every leaf severely infected on 5 Oct. (J.D. MacLachlan).

JUGLANS

Bacterial Blight (Xanthomonas juglandis) was common on walnut (J. regia) at Courtenay and North Saanich, B.C. (W. Jones). It was present on the leaves of seven trees in gardens at Agassiz and Chilliwack; large, sunken lesions occurred on the husks at Chilliwack (H.N.W. Toms).

JUNIPERUS - Juniper

Rust (Gymnosporangium Nelsoni) was common on staminate and pistillate cones of J. scopulorum at Macalister, Cariboo district, B.C. (J.M. Macalister, W. Jones).

LARIX - Larch

Rust (Melampsora Bigelowii) was conspicuous on western larch (L. occidentalis) in August, in seedling and sapling stands in south-eastern B.C. Damage was particularly heavy at Cascade Summit, between Rossland and Grand Forks, at about 4500 ft. (R.E. Foster).

MALUS - Apple

Rust (Gymnosporangium sp.). A light infection occurred in October on an ornamental apple at Brentwood, B.C. The spores and peridia do not agree well with those of any of the species known to attack Malus and its exact identity is uncertain (W. Jones, I.L. Conners).

PICEA - Spruce

Rusts (Chrysomyxa spp.). Cone rust, C. Pyrolae, was abundant on both P. Engelmanni and P. glauca var. albertiana in B.C. Damage to the former was most severe near Talla Lake and to the latter in the Prince George - Quesnel region. It seems to have been exceptionally abundant everywhere on both hosts. Needle rust, C. ledicola, was conspicuous between Prince Rupert and Terrace in northern B.C.; damage was most severe on seedlings and saplings (R.E. Foster). C. Empetri and C. ledicola were abundant on the needles and occasional on the cones of P. glauca and P. mariana at Great Whale River, Que. Young spruce must often grow up through a nearly solid cover of Empetrum or Ledum and often suffer serious defoliation under these conditions. Both these rusts must complicate the advance of spruce into the tundra. C. Woronini Tranzschel, which is systemic and perennial, forming small witches' brooms, on Ledum palustre, and is systemic but not perennial in the shoots of spruce, and which lacks uredinia, was found on L. palustre var. decumbens near Dawson, Yukon, and on P. glauca at Great Whale River, Que. This rust has not previously been reported in North America (D.B.O. Savile). (See D.B.O. Savile. North American species of Chrysomyxa. Can. J. Res. In press).

Timber Rot (Fomes Pini), a white pocket rot, is the cause of considerable cull spruce in N.B. (V.J. Nordin).

PINUS - Pine

Rust (Coleosporium Solidaginis) was heavy on 11 June at Britannia, near Ottawa, Ont., on three 3-ft. trees of P. resinosa planted in an old pasture. Trees in the main plantation were unaffected (A.R. Buckley, I.L. Conners).

Blister Rust (Cronartium ribicola) is ubiquitous on P. Strobus in N.B. The incidence in natural stands ranged from 12.2% at Bathurst Lake to 46.0% at Island Lake. Surveys are less complete for N.S., but in the areas sampled incidence ranged from 3.1% at Kentville to 35.0% at Millford (V.J. Nordin).

Rust (Cronartium spp.). It has recently been shown (G.G. Hedgcock and P.V. Siggers. A comparison of the pine-oak rusts. U.S.D.A. Tech. Bull. 978. 1949) that Cronartium Quercuum is restricted to China and Japan. Most of the records in eastern Canada ascribed to that species belong to C. cerebrum Hedgc. & Long; but C. coleosporioides also occurs in Que. and N.B. (D.B.O.S.).

Needle Blight (Hypodermella concolor (Dearn.) Darker) was evident on lodgepole pine (P. contorta var. latifolia) throughout its range in B.C. It was particularly heavy from Prince George to Cache Creek and eastward (R.E. Foster).

Pole Blight (cause unknown) of western white pine (P. monticola), has gained considerable headway in pole-sized stands in southeastern B.C. It has unquestionably passed for white pine blister rust for some years. Its range seems to be coincident with that of its host in the interior, but it has not been detected on the coast. Workers in the United States have devised an elaborate system of diagnosis in which the sum of numerical ratings of a number of symptoms determines the condition of presumably infected trees. The most reliable indicator seems to be a combination of bark resinosis, flattened bark surfaces, elongated brownish lesions in the cambium beneath flat surfaces, and thinning and yellowing of the foliage in the upper crown. Severely affected trees are readily recognized by their dead, bare tops (R.E. Foster).

POPULUS - Poplar

Yellow Leaf Blister (Taphrina aurea) was general on a few Lombardy poplars (P. nigra var. italica) at Oyster River, B.C. (W. Jones).

PRUNUS

Black Knot (Dibotryon morbosum) was severe on a tree of Prunus sp. at Calgary, Alta. (M.W. Cormack). Specimens of affected P. virginiana were received from Renfrew, Ont. (H.N. Racicot). It varied from trace to very heavy on P. pennsylvanica and P. serotina in Prince and Queens Counties, P.E.I. (R.R. Hurst).

PSEUDOTSUGA - Douglas Fir

Canker (Phomopsis lokoyae) was seen in two places in B.C. on P. taxifolia. One very localized area was in the lower Fraser Valley, north of Haney; the second, in the interior about 300 miles away, extended 23 miles along the highway from Soda Creek to Alexandria. The disease became evident in both areas in early summer, following a very

wet summer in 1948 and a severe winter. Cankers were mostly on the bole, rarely at diameters over 4 in., and were always centred at a branch. Many killed leaders were seen, but death of the tree is to be expected only when the stem of a very young tree is girdled (R.E. Foster).

PYRACANTHA - Firethorn

Scab (Fusicladium Pyracanthae) was general on P. coccinea at the University campus, Vancouver, B.C., causing disfigurement of the fruit (H.N.W. Toms).

QUERCUS - Oak

Rust (Cronartium spp.). See note under Pinus. The pine-oak rust of eastern Canada is referable to C. cerebrum rather than C. Quercuum under which it has been treated in the past (D.B.O.S.).

Leaf Blister (Taphrina coerulescens) was heavy on Q. palustris and light on adjacent Q. borealis planted in the arboretum of the Experimental Station, Ste. Anne de la Pocatiere, Que. (A. Payette).

RHAMNUS - Buckthorn

Rust (Puccinia coronata) was heavy on R. cathartica at Ste. Anne de la Pocatiere, Que. (A. Payette). It was trace to light on the same host at various locations in York, Carleton and Westmorland Counties, N.B. P. coronata var. Agrostis was lighter on R. Frangula at Fredericton than in any year since it has been under observation (J.L. Howatt). Only traces of rust were found on R. cathartica in Queens and Prince Counties, P.E.I. (R.R. Hurst).

SALIX - Willow

Witches' Broom (Diplodina Salicis West.) was seen at Saskatoon and Senlac, Sask., in late summer (E.J. Hawn, T.C. Vanterpool).

ULMUS - Elm

Dutch Elm Disease (Ceratostomella Ulmi). In Quebec during 1949 considerably less scouting and control work was done than in previous years. The disease has now become so well established in the central part of the infected area that further efforts to control it there seemed to be inadvisable, and work was confined to the outer counties of the affected section of the province. In the western part of the infected area there was considerable intensification of the disease in the counties bordering the Ottawa River. In Two Mountains, for example, 110 infected trees were found in 1949 and 8 in 1948, while the corresponding figures for Argenteuil were 26 and 11 and for Vaudreuil 8 and 0. There was some extension of the area of infection towards the south, diseased trees being found in two border counties, Mississquoi and Stanstead for the first time. In the former, infected trees occurred within three miles of the Vermont border and in the latter within 8 miles of the New Hampshire line.

In eastern Ontario, where in 1948 one diseased tree was located and the causal fungus was isolated from 13 dead or dying trees, an increased amount of scouting was done this year. Particular attention

was paid to the examination of elms in the vicinity of the 14 trees mentioned. However, not a single instance either of a diseased tree or of the causal fungus existing saprophytically in a dead tree was found (A.W. McCallum).

Coral Spot (Tubercularia ulmea) was again prevalent at the Botanical Garden, Montreal, Que., in hedges of U. pumila, and these hedges were finally removed. The disease was found in several other areas in Montreal (J.E. Jacques).

Wilt (Verticillium sp.). In late June a tree at Lethbridge showed a severe wilt affecting nearly two thirds of the foliage. V. sp. was isolated (M.N. Grant, Ruth Macrae).

VI. DISEASES OF ORNAMENTAL PLANTS

ACHILLEA

Rust (Puccinia Millefolii Fekl.) was again heavy at Ste. Anne de la Pocatière, Que., on A. Ptarmica var. The Pearl. This year a little rust was also found on adjacent A. Millefolium. Examination of a wider range of specimens on both host species fails to indicate any real difference. European observations have suggested host specialization, but the observations at Ste. Anne indicate that even that is not complete. Certainly there is no basis for specific distinction and P. Ptarmicae is accordingly to be regarded as a synonym of P. Millefolii. There is a tendency for the spores to be broader, on the average, in some specimens on A. Ptarmica than in those on A. Millefolium, but this seems to be a mechanical effect resulting from differences in host anatomy; it is no more significant than the variations often encountered from pustule to pustule in many Puccinia spp. Although this is the first record of P. Millefolii on A. Millefolium from southern Que., it is endemic on this species in northern Que., having been recorded from Chimo and Great Whale River (A. Payette, D.B.O. Savile).

ACONITUM - Monkshood

Yellows (Calistephus virus 1) severely affected two plants in a garden at Fredericton, N.B. (D.J. MacLeod).

ALTHAEA - Hollyhock

Rust (Puccinia Malvacearum) was common on A. rosea at North Saanich, B.C. (W. Jones). Owing to the dry season it caused little damage in the B.C. interior; plants were mostly unrusted, and when infection did occur it did not exceed 5% and caused negligible injury (G.E. Woolliams). Traces occurred on the lower leaves of A. rosea at the Botanical Garden, Montreal, Que. (J.E. Jacques). It was heavy and defoliated all but the tops of the plants in a planting at Kentville, N.S. (C.O. Gourley). Infection in P.E.I. was about average, varying from trace to heavy, damage nil to severe. It seriously limits hollyhock production (R.R. Hurst). It should be noted that this species is greatly stimulated by sprinkling in gardens, which is a common explanation of serious damage in dry summers; application of water directly to the soil in perennial borders greatly reduces damage (D.B.O.S.).

Stem Rot (Sclerotinia sp.) caused moderate damage in a garden at Edmonton, Alta. (A.W. Henry).

ANTIRRHINUM - Snapdragon

Powdery Mildew (?Erysiphe Cichoracearum) was collected in a greenhouse at Victoria, B.C., in April. The conidia agree well will those of E. Cichoracearum to which the specimen probably belongs (W.R. Foster, D.B.O. Savile).

Root Knot (Heterodera marioni). A specimen was received from Elmira, Ont. (J.D. MacLachlan).

Anthracnose (Gloeosporium Antirrhini) was severe on leaves and stems of a specimen received from Montreal in November. Previously reported, from Que. only, in 1927 (D.B.O. Savile).

Downy Mildew (Peronospora ?Antirrhini Schroet.). Specimens were received in September from Murillo, Ont. The disease started in frames before the plants were set in greenhouse beds. Plants were stunted and many were lost. Buds were set prematurely. Cheviot Maid No. 33, Peggy Schumann and Ball's Yellow Hybrid were affected. First report in Canada (J.D. MacLachlan). Gäumann gives the spores of P. Antirrhini (s.s.) as mostly 20-29 x 16-25 microns. In material transmitted by Dr. MacLachlan the spores are 23.5-40 x 13-18 microns, generally twice as long as they are wide, and are close to the figures given for P. canadensis Gäum., described from Linaria canadensis in Mass. with spores (30.5)-34-41.5-(43) x (9.5)-13-21-(22.5) microns. However, Kenneth F. Baker (in litt.) states that in Calif. spores measured 21-99 x 14-17 microns, intermediate between Gäumann's two sets of figures, and suggests that the complex has been split too far. It is likely that we actually have a single variable species with a greater host range than Gäumann anticipated; but wider collecting and all possible cross-inoculation studies are needed. It is quite possible that some endemic strains on Linaria will prove to be highly virulent to A. majus (D.B.O. Savile).

Rust (Puccinia Antirrhini) was general in a commercial seed crop at Elk Lake, B.C. Spraying with Bordeaux mixture gave partial control (W. Jones). Rust caused little damage in the B.C. interior, owing to the dry season. Infection ranged up to 5% under favourable conditions (G.E. Woolliams).

Basal Rot (cause uncertain). About 1/3 of the plants in a border at Lethbridge, Alta., were killed shortly before flowering. An unidentified Phycomycete was isolated from the roots (M.W. Cormack). A basal rot caused some trouble in the municipal parks at Regina, Sask. Phytophthora sp., with amphigenous antheridia, and Fusarium app. were isolated (T.C. Vanterpool).

Yellows (Callistephus virus 1). A trace was found in a garden at Fredericton, N.B. (D.J. MacLeod).

AQUILEGIA - Columbine

Powdery Mildew (Erysiphe Polygoni) was frequently found on foliage in gardens in the B.C. interior (G.E. Woolliams).

Leaf Spot (Septoria Aquilegiae Ell. & Kellerm.). Infection of A. canadensis at Dalhousie Lake, Lanark Co., Ont., was 10-16% on 31 May (W.R. Childers, J.A. Parmelee). Previously recorded from Que.

ASTER

Powdery Mildew (Erysiphe Cichoracearum) became general late in the summer at the Botanical Garden, Montreal, Que. (J.E. Jacques).

BEGONIA

Grey Mould (Botrytis cinerea) slightly disfigured leaves and flowers of tuberous begonia in a garden at Vancouver, B.C., in August (H.N.W. Toms). A specimen was received from Elora, Ont., on 20 June

(J.D. MacLachlan). Affected leaves from Montreal, Que., were brought in on 26 Aug. with the complaint that the plants were severely infected (J.E. Jacques).

Powdery Mildew (?Erysiphe Cichoracearum). Specimens were received from Waterloo, Ont., on 1 June, and from Woodford on 8 Sept. (J.D. MacLachlan). See P.D.S. 28:105. 1949.

Root Knot (Heterodera marioni) was seen on two plants in a greenhouse at Victoria, B.C. Large galls occurred at the bases of the stems and small ones on the roots (E. Howard).

BERBERIS - Barberry

Rust (Puccinia graminis) was moderate on a few plants of B. vulgaris at Ste. Anne de la Pocatière, Que., and a trace in a colony at St. Roch des Aulnaies (A. Payette). Infection of B. vulgaris in York Co., N.B., was lighter than for several years (J.L. Howatt).

BOLTONIA

Streak (virus) severely affected 51% of the plants at the Station, Fredericton, N.B. (D.J. MacLeod).

CALENDULA

Yellows (Callistephus virus 1) severely affected all the plants in two gardens at Fredericton, N.B. (D.J. MacLeod). Infection was trace to 100%, av. 10%, and about as in other years, on all varieties observed in Queens Co., P.E.I. (R.R. Hurst).

CALLISTEPHUS CHINENSIS - China Aster

Wilt (Fusarium oxysporum f. Callistephi) was general in a garden at Stony Plain, Alta. (A.W. Henry). It was severe in two plantings of supposedly wilt-resistant asters near Winnipeg, Man. The pathogen was isolated in each case (W.L. Gordon, B. Peturson). Wilt was reported to be severe in two gardens near Montreal, Que.

Yellows (Callistephus virus 1) was severe in plots at Edmonton, Alta. (T.R.D.). It was severe this summer at Kamsack and Saskatoon, Sask. See also Zinnia (T.C. Vanterpool). Yellows was moderately severe in the Saskatoon area, and to judge from specimens and correspondence it was severe in southwest Sask. (H.W.M.). All the plants in two gardens at Fredericton, N.B., were severely affected (D.J. MacLeod).

CAMPANULA

Rust (Coleosporium Campanulae) was lighter than usual on C. rotundifolia var. intercedens at Rivière Ouelle, Kamouraska Co., Que, (A. Payette).

CHRYSANTHEMUM

Powdery Mildew (Erysiphe Cichoracearum). A specimen was received from Belle River, Ont. (J.D. MacLachlan). Infection was a trace in a greenhouse at Falmouth, N.S. (J.F. Hockey).

Wilt (Fusarium sp.). A specimen was received from Stratford, Ont. (J.D. MacLachlan).

Leaf Spot (Septoria chrysanthemella). A specimen was received from London, Ont. (J.D. MacLachlan).

Yellows (Callistephus virus 1). Infection was 2% in a garden at Fredericton, N.B. (D.J. MacLeod).

Oedema (physiological) appeared in a greenhouse at Crystal Beach, Ont., on young plants. The plants outgrew the condition and flowered normally (G.C. Chamberlain).

Spray Injury. Application of Parathion in a greenhouse at St. Catharines, Ont., in October when the house was very hot (over 100°F.) caused injury to plants whose buds were about to open. Affected heads did not open normally and the bloom was unsaleable. Less advanced plants were unaffected (G.C. Chamberlain).

COREOPSIS

Yellows (Callistephus virus 1). A trace was found in a garden at Fredericton, N.B. (D.J. MacLeod).

CYCLAMEN

Stunt (Cladosporium Cyclaminis). Traces were observed in a commercial greenhouse at Montreal, Que. (J.E. Jacques).

DAHLIA

Storage Rot (?Pythium sp.). Several hundred tubers were affected in commercial storage houses at New Westminster and Burnaby, B.C. (I.C. MacSwan).

Stunt (virus) severely damaged several varieties in Queens Co., P.E.I. (R.R. Hurst).

DAPHNE

Anthracnose (Marssonina Daphnes) was heavy on most of the bushes of D. Mezereum in the Vancouver area, B.C. Defoliation in several successive years causes eventual death (H.N.W. Toms).

DELPHINIUM - Larkspur

Powdery Mildew (Erysiphe Polygoni). Traces occurred on lower leaves at the Botanical Garden, Montreal, Que. (J.E. Jacques). It was light in gardens at Charlottetown, P.E.I. (R.R. Hurst).

Bacterial Blight (Pseudomonas delphinii). A specimen was received from Stratford, Ont. (J.D. MacLachlan). Slight damage occurred at the Botanical Garden, Montreal, Que. (J.E. Jacques).

DIANTHUS

Blight (Alternaria sp.). Specimens of branch rot of carnation were received from Campbellford and St. Marys, Ont. (J.D. MacLachlan). Most of our early records were ascribed to A. Dianthi, but Dr. Neergaard pointed out during his visit to North America that A. dianthicola is the widely-established pathogen, whereas A. Dianthi is little known and doubtfully

parasitic. It would be greatly appreciated if specimens of Alternaria on Dianthus could be sent to Dr. Groves to aid in assessing the situation (D.B.O.S.).

Wilt (Fusarium sp.). Specimens of carnation were received from London and Dunnville, Ont. (J.D. MacLachlan).

Bud Rot (Fusarium Poae). Specimens were received from Montmagny, Que., where the disease was reported as severe (J.E. Jacques).

Leaf Spot (Heterosporium echinulatum) was severe in March in a greenhouse at Langley, B.C. on several varieties of sweet william, D. barbatus and carnation, D. caryophyllus. Leaf lesions generally were in the form of well-defined ring spots, but stem lesions also occurred, which sometimes girdled the plant. Among carnation varieties Maytime and My Love and its sports proved very susceptible. Olivette, Peter Fisher and Tom Knife showed moderate resistance. The grower claimed that heavy applications of potassium sulphate helped to control the disease. Spraying with Parzate later appeared to give good control (W. Jones, H.N. Olds).

Stem Rot (Pellicularia filamentosa). Specimens of carnation were received from Goderich, Ont. (J.D. MacLachlan).

DIMORPHOTHECA - Cape Marigold

Yellows (Callistephus virus 1). A trace was found in a garden at Fredericton, N.B. (D.J. MacLeod).

ERIGERON - Fleabane

Yellows (Callistephus virus 1). A trace was present on E. mucronatus in the laboratory disease garden, Fredericton, N.B. (D.J. MacLeod).

ESCHSCHOLZIA

Yellows (Callistephus virus 1). Two plants were severely infected in a garden at Fredericton, N.B. (D.J. MacLeod).

GAILLARDIA

Yellows (Callistephus virus 1). A trace was found in a garden at Fredericton, N.B. (D.J. MacLeod).

GLADIOLUS

Leaf Spot (Alternaria tenuis). About 10% of the plants in a field in Halton Co., Ont., were affected when observed 22 July. Pathogenicity verified by greenhouse inoculations. Organism identified by J.W. Groves (S.A. Simmons).

Dry Rot (Fusarium oxysporum var. Gladioli). Infection was moderate in specimens received from a gardener at Vancouver, B.C. (I.C. MacSwan). Infection was about 5% in a plantation near Wilsonville, Ont. (S.A. Simmons). Specimens were received in January 1949 from a grower at Toronto, with the statement that infection was heavy (J.E. Jacques). Two infected corms of U.S. origin were received from St. Johns, Nfld., in June. Organism determined by W.L. Gordon (J. Sibalis).

Yellows (Fusarium orthoceros var. Gladioli). What appeared to be this disease was common at Saskatoon, Sask., and was also seen at Kamsack,

in August. Plants failed to bloom, roots were attacked, and plants and corms were small, but the corms were not rotted (T.C. Vanterpool). Nine plants with chlorotic leaves and rotting corms were received 8 July from Chateauguay, Que. All isolations yielded Fusarium (J. Sibalis).

Storage Rot (Penicillium Gladioli). Infection was moderate in May in specimens sent in by a gardener at Vancouver, B.C. (I.C. MacSwan). It was severe in April in corms from a garden at Saskatoon, Sask. (T.C. Vanterpool). Corms were received from Marieville, Que., in November (J.E. Jacques).

Scab (Pseudomonas marginata) was heavy on 3 corms received from Windsor, Ont., and one from Hamilton, in January 1950 (D.B.O. Savile), and on one from Apple Hill submitted in May 1949 (J. Sibalis). Specimens were received from Plantagenet, where it was stated to be severe. Scab was the most serious disease of gladiolus at the Botanical Garden, Montreal, Que. (J.E. Jacques).

Core Rot (Sclerotinia Draytoni) was much less severe near Guelph, Ont., than during the 3 last years. A rather severe outbreak of the neck-rot phase was seen in a planting near Simcoe (S.A. Simmons). Specimens received in December 1949 from Norwich showed 20% infection in Snow Princess and 65 to 95% in Alladin, Elizabeth Queen, Gaylore, Orange Gold and Red Charm. Sclerotia were abundant on several corms. Curing had clearly been inadequate. Infection was heavy on various varieties of which specimens were received from Montreal, Que., in January 1950 (D.B.O. Savile). A few specimens were received from Truro, N.S. (J.F. Hockey). Severely rotted specimens were received from Charlottetown, P.E.I. in March (R.R. Hurst, D.B.O. Savile).

Hard Rot (Septoria Gladioli) was very severe in specimens sent in from Bowmanville, Ont. in April (D.B.O. Savile).

Mosaic (Phaseolus virus 2). Infected spikes of Picardy were brought in from Joliette, Que. (J.E. Jacques).

Chemical Injury (naphthalene fumigation). Following fumigation for control of thrips in December, nearly all corms of every variety at the Arboretum, Ottawa, Ont., showed sunken irregular lesions somewhat resembling hard rot. The flesh below the lesions was unaffected. A similar lot of corms planted a few years ago grew normally. Inadequate curing before treatment, impure naphthalene and fluctuating temperature during treatment may all possibly contribute to this injury. We have received specimens previously, occasionally with sublimed naphthalene on some of the lesions, but have never previously secured full data. It is suspected that a sudden temperature increase, causing naphthalene to volatilize from the outer part of the container and sublime on the still cold corms near the centre, may be the commonest explanation. It is believed that other chemicals may give similar symptoms, because one such lot was seen that definitely had not received naphthalene treatment (D.B.O. Savile).

GODETIA

Yellows (Callistephus virus 1) severely injured all 10 plants in the laboratory disease garden, Fredericton, N.B. (D.J. MacLeod).

HELIANTHUS - Sunflower

Downy Mildew (Plasmopara Halstedii). Specimens of H. rigidus var. Miss Mellish were received from Gananoque, Ont., in June. The disease was reported on this host from the same garden in P.D.S. 26:85 (I.L. Conners).

Rust (Puccinia Helianthi) was light on the lower leaves of H. annuus and H. tuberosus at Kentville, N.S. (K.A. Harrison).

HELICHRYSUM - Everlasting

Yellows (Callistephus virus 1) affected 7 plants in the laboratory disease garden, Fredericton, N.B. (D.J. MacLeod).

HYACINTHUS - Hyacinth

Soft Rot (Erwinia carotovora). Specimens of L'Innocence and a blue variety were received from two commercial greenhouses at London, Ont., in February 1950. Blossom buds were blighted and in some cases rotting of the scape had occurred. Both lots were from imported bulbs. First reported in P.D.S. 28:109 (D.B.O. Savile).

Yellows (Xanthomonas hyacinthi). Infection was light in a garden at Vancouver, B.C. (I.C. MacSwan).

HYDRANGEA

Powdery Mildew (Oidium sp.) completely ruined 800 plants in a greenhouse in Toronto, Ont., in April. No control had been attempted and the fungus almost completely over-ran blossoms and leaves, causing necrosis of the latter (D.B.O. Savile).

Stem Rot (Sclerotinia Sclerotiorum) attacked most of 130 plants shipped to Forbes, Ont., from a nursery at Vancouver, B.C. In the specimens, received on 7 Dec. 1949, almost every shoot had been rotted back and sclerotia were present on several. A letter from the growers indicated that they had experienced the trouble on a number of occasions but that they were not attempting to control it (D.B.O. Savile).

IRIS

Bacterial Leaf Blight (Bacterium tardicrescens). A large bed at the Botanical Garden, Montreal, Que., containing many varieties was moderately affected (J.E. Jacques).

Leaf Spot (Didymellina macrospora) was general in the interior of B.C., but caused little damage owing to the dry season (G.E. Woolliams). Infection was moderate at Beaverlodge and light at Edmonton, Alta. (T.R.D.).

Soft Rot (Erwinia carotovora) attacked a few odd plants at the Botanical Garden, Montreal, Que. (J.E. Jacques).

LATHYRUS

Streak (Erwinia lathyri). The pathogen was recovered by the Dept. of Bacteriology, O.A.C., from specimens (J.D. MacLachlan).

Powdery Mildew (Microsphaera Alni) was a trace on several varieties in gardens at Charlottetown, P.E.I. (R.R. Hurst).

Mosaic (Pisum virus 2) caused breaking in a single plant of Ecstasy at Charlottetown, P.E.I. (R.R. Hurst).

Bud Drop (excess nitrogen) was trace to 10%, av. 2%, in gardens in Queens Co., P.E.I. (R.R. Hurst).

LILIUM - Lily

Nematode Blight (Aphelenchoides ritzema-bosi). Infection was 3% in forced plants of Croft and White Queen in the greenhouse at the Station, Saanichton, B.C., in January 1949 (D.B.O. Savile).

Blight (Botrytis elliptica). Traces were seen at the Botanical Garden, Montreal, Que., and specimens were received from St. Jacques de Montcalm (J.E. Jacques).

Rust (Uromyces Holwayi) was light and caused slight damage to L. canadense at Ste. Anne de la Pocatière, Que. (A. Payette). Not previously reported in the Survey, but we have specimens on L. spp., wild and cultivated, from B.C. and Ont., and on L. philadelphicum from Orford, Que. (D.B.O.S.).

LONICERA - Honeysuckle

Leaf Blight (Glomerularia Lonicerae) combined with powdery mildew to cause early defoliation at the Botanical Garden, Montreal, Que. (J.E. Jacques).

Powdery Mildew (Microsphaera Alni) was general at the Botanical Garden, Montreal, Que., by mid August and became severe in September. It was also common in hedges in Montreal (J.E. Jacques).

LUPINUS - Lupine

Yellows (Callistephus virus 1). A trace was found in a garden at Fredericton, N.B. (D.J. MacLeod).

MAHONIA

Rust (Cumminsiella sanguinea). A moderate outbreak occurred on M. Aquifolium in the Arboretum, Ste. Anne de la Pocatière, Que. All stages were present (A. Payette). Apparently the first record from eastern North America, but this rust has in recent years become well established in parts of western Europe. It was presumably introduced with nursery stock (D.B.O.S.).

NARCISSUS

Basal Rot (Fusarium spp.) was found in two lots of bulbs from Vancouver Island, inspected before shipment, but the incidence was under 5%. None was found in lots entered for certification on the mainland (R.P. Messum). In P.D.S. 28:111, under Basal Rot, it was reported that 160 crates of daffodil bulbs in a shipment from B.C. to England were declared a total loss upon inspection at Montreal on 8 Sept. Subsequently it was learned that the shipment had been fumigated by a commercial firm before shipment with 4 lb. methyl bromide per 1000 cu. ft. of space for 13 hrs., instead of the recommended 3 lb. for 4 hrs. From the condition of the bulbs upon inspection and the subsequent investigation, it is believed that the loss was due primarily to over-fumigation. High temperature in transit probably aggravated the injury (I.L. Conners).

Smoulder (Sclerotinia narcissicola) was noted in 11% of plantings inspected on Vancouver Island, B.C., but did not exceed 0.4% in any. On the mainland the incidence of primary lesions averaged 0.4% in 54% of the plantings at first inspection. Almost no secondary infection occurred in rogued or general plantings (R.P. Messum).

Leaf Scorch (Stagonospora Curtisii). A trace was present in 11% of the plantings inspected on Vancouver Island, B.C. On the mainland infection averaged 0.1% primary lesions in 42% of the plots entered for certification, and very little secondary infection was seen. As usual, infection was much higher in two-year-old plantings and reached 60% in one (R.P. Messum).

Decline (virus). This disease has been present in B.C. for some time under a variety of names; e.g., white streak, paper tip, and purple streak. Although much observational data has been accumulated, little experimental work has been done. Every planting of the large trumpet varieties showed infection, and loss from this disease probably exceeds all others combined. All plantings inspected on Vancouver Island were infected. Thirty-three per cent of plantings of King Alfred carried less than the 2.5% tolerance. On the mainland 54% of King Alfred plantings had been rogued to within 2.5%, but the remainder showed up to 12%. In some unrogued plantings infection was nearly 100% (R.P. Messum).

Mosaic (virus) was present in 33% of plantings inspected on Vancouver Island, B.C., but did not exceed 0.4% in any. Little was noted on the mainland, partly perhaps because many inspections of general plantings were made late in the season when symptoms are obscure (R.P. Messum).

Frost Injury. Prolonged cold weather in B.C. killed several layers of tissue on the necks of bulbs, which combined with the normally sloughed layers to form a tough sheath round the emerging shoot; however, damage was very slight (R.P. Messum).

NIGELLA

Yellows (Callistephus virus 1). A trace was found in the laboratory disease garden at Fredericton, N.B. (D.J. MacLeod).

PAEONIA - Peony

Blight (Botrytis Paeoniae). A specimen was received from a garden on Mayne I., B.C.; damage slight to moderate (I.C. MacSwan). A light infection was seen at Edmonton, Alta. (T.R.D.). It was common, damage usually slight, in peony beds at Saskatoon, Sask. (H.W.M.). Specimens were received from London, Stratford and Sarnia, Ont. (J.D. MacLachlan). Diseased plants were received from St. Vincent de Paul, Que. (J.E. Jacques). Four specimens were brought in from Queens Co., P.E.I.; damage usually moderate (R.R. Hurst).

Leaf Blotch (Cladosporium Paeoniae). Traces appeared toward mid August at the Botanical Gardens, Montreal, Que. (J.E. Jacques).

Mosaic (virus) has been observed for several years in the same plants at the Botanical Garden, Montreal, Que. The plants do not seem to be affected materially (J.E. Jacques).

Ring Spot (virus). Twelve plants at the Station, Fredericton, N.B., showed marked symptoms (D.J. MacLeod). Four plants in a garden at Charlottetown, P.E.I., were severely damaged (R.R. Hurst).

Bud Blight (?non-parasitic) affected 5% of buds of Karl Rosenfield at Charlottetown, P.E.I. It is most marked in unthrifty plants (R.R. Hurst).

PAPAVER - Poppy

Bacterial Blight (Xanthomonas papavericola). The pathogen was recovered by the Dept. of Bacteriology, O.A.C., from a specimen sent in from Wallacetown, Ont. (J.D. MacLachlan).

PELARGONIUM - Geranium

Grey Mould (Botrytis cinerea). Specimens were received from a garden in Montreal, Que. (J.E. Jacques).

Crinkle (virus). Specimens were received from Garson Mine, Chatham and Simcoe, Ont. (J.D. MacLachlan).

Mosaic (Cucumis virus 1). A specimen was sent in from Hamilton, Ont. (J.D. MacLachlan). Four plants in a garden at Fredericton, N.B., showed severe mottling and stunting (D.J. MacLeod).

PETUNIA

Yellows (virus) was seen in November in three plants sent in from Merwin, Sask., that had been potted and brought indoors (T.C. Vanterpool). Yellows was general in gardens at Fredericton, N.B.; infection ranged from trace to 12%, av. 4% (D.J. MacLeod).

PHLOX

Powdery Mildew (Erysiphe Cichoracearum) was generally prevalent on susceptible varieties in Ont., particularly in shaded situations. Specimens were received from Albion, Alvinston and Athlone (J.D. MacLachlan). Infection was moderate at the Botanical Garden, Montreal, Que. (J.E. Jacques).

Leaf Spot (Septoria divaricata). A few spots occurred on the lower leaves of annual phlox, P. Drummondi, but caused little damage, at the University, Vancouver, B.C., in late July. It was seen on the same host in early August at White Rock (H.N.W. Toms).

Yellows (Callistephus virus 1) was general and severe on P. Drummondi in York Co., N.B. Infection averaged 27% (D.J. MacLeod).

Blight (cause uncertain) was severe on all varieties of P. paniculata at the Botanical Garden, Montreal, Que. (J.E. Jacques). Eight severely affected plants were found in one of the borders at the Station, Fredericton, N.B. (D.J. MacLeod). Blight was a trace to heavy, and usually caused severe damage, in many varieties in gardens at Charlottetown, P.E.I. Damage is most severe in old plants (R.R. Hurst).

PORTULACA

Leaf and Stem Blight (Helminthosporium Portulacae Rader: Mycol. 40:342-346. 1948) was common on P. oleracea in field plots and in the greenhouse at the University, Saskatoon, Sask. Conidia were 150-160 x 13 microns (E.T. Reeder). Infected plants of P. grandiflora were received in August

from Gananoque, Ont., from the same garden in which it apparently occurred in 1940. It was later found on both hosts at Macdonald College, Que. (J. Sibalis, I.L. Conners).

ROSA - Rose

Crown Gall (Agrobacterium tumefaciens) caused considerable damage to hybrid tea roses at Brentwood, B.C. Galls were mainly on the roots (W. Jones). Specimens were sent in from Sardis and Hammond (I.C. MacSwan).

Grey Mould (Botrytis cinerea). A specimen was received from Port Burwell (J.D. MacLachlan).

Black Spot (Diplocarpon Rosae) was common in the plots at O.A.C., Guelph, Ont., and specimens were sent in from Drumbo and Toronto (J.D. MacLachlan). It was common and caused much defoliation of hybrid teas and hybrid polyanthas in the St. Catharines area (G.C. Chamberlain). It was less severe than usual at the Botanical Garden, Montreal, Que. (J.E. Jacques). Infection was trace to heavy, av. 10%, at Charlottetown, P.E.I. (R.R. Hurst).

Stem Canker (Leptosphaeria Coniothyrium). Specimens were received from Woodstock and Toronto, Ont. (J.D. MacLachlan).

Rust (Phragmidium spp.). An ornamental rose at Meadows, Man., was almost completely destroyed by P. speciosum in June (W.A.F. Hagborg, I.L. Conners). Specimens of the caeoma stage of P. speciosum from Pictou, N.S., received in July, showed infection of petioles, buds and blossoms. A hedge 20 ft. long was said to have been practically destroyed and the rust was spreading to other bushes 50 ft. away (I.L. Conners). P. subcorticinum was less prevalent than in recent years in the rose plots at O.A.C., Guelph, Ont. A specimen was received from Uxbridge (J.D. MacLachlan). P. sp. was reported on cultivated roses at Nanton, Alta. (A.W. Henry).

Anthracnose (Sphaceloma Rosarum). A specimen was sent in from St. Jacob's, Ont. (J.D. MacLachlan).

Powdery Mildew (Sphaerotheca spp.). S. Humuli was severe on indoor plants at Turtleford, Sask. (H.W.M.). S. pannosa was prevalent on climbing roses late in the season at O.A.C., Guelph, Ont. Specimens were received from Galt, Georgetown, Woodstock, Meaford and Kitchener (J.D. MacLachlan). It was very heavy on susceptible ramblers in the St. Catharines district in August, causing stunting of cane growth (G.C. Chamberlain). Traces of S. pannosa occurred on a few varieties at the Botanical Garden, Montreal, Que. (J.E. Jacques). Mildew was heavy on a climbing rose at Richmond, P.E.I. (D. Robinson), and on Crimson Rambler in Kings Co. (R.R. Hurst).

SCABIOSA

Yellows (Callistephus virus 1). Severely affected plants were found in a garden at Fredericton, N.B. (D.J. MacLeod).

SIBIRAEA

Crown Gall (Agrobacterium tumefaciens). A large gall was present on the main stem of a plant received from a nursery at Sheridan, Ont. (J. Sibalis).

SOLIDAGO - Goldenrod

Powdery Mildew (Erysiphe Cichoracearum) was moderately heavy on all plants at the Botanical Garden, Montreal, Que. (J.E. Jacques).

SYRINGA - Lilac

Powdery Mildew (Microsphaera Alni). Specimens were received from various sources in Montreal, Que. (J.E. Jacques).

Bacterial Blight (Pseudomonas syringae) was seen on lilacs in a private estate at Montreal, Que. (J.E. Jacques).

TAGETES - Marigold

Yellows (Callistephus virus 1) was general in gardens in York Co., N.B., av. infection 11% (D.J. MacLeod). Infection was 2-100% in gardens at Charlottetown, P.E.I., on Harmony and other varieties (R.R. Hurst).

TULIPA - Tulip

Fire (Botrytis Tulipae). On Vancouver Island, B.C., infection was slight in 51% of plantings inspected and moderate in 24%. On the mainland losses were negligible owing to the dry spring weather. Primary lesions were seen in 37% of the plantings and averaged less than 0.4% at first inspection, and in only 7% with an average of 1.8% at second inspection. A trace of secondary infection was seen in 63% of the fields, and slight to severe infection in 10% (R.P. Messum). Infection was moderate at the Botanical Garden, Montreal, Que., and specimens were received from Drummondville and Levis (J.E. Jacques). Infection ranged from trace to 50% of plants near Kentville, N.S. (J.F. Hockey). It was a trace in many gardens and heavy at two locations in Queens Co., P.E.I. (R.R. Hurst).

Bulb Rot (Sclerotium Delphinii). Specimens of forced Her Grace, and possibly other varieties, severely rotted, were received from St. John's, Nfld., in April. The characteristic sclerotia and mycelial fans were seen in several bulbs. The bulbs had been imported, but it is not known whether the pathogen was introduced with the bulbs or the soil (F.L. Drayton, D.B.O. Savile).

Gray Bulb Rot (Solerotium Tuliparum). Moderate damage occurred in a garden at Vancouver, B.C., in May (I.C. MacSwan).

Break (virus) is common in home gardens in the interior of B.C. and was also seen in some commercial plantings (G.E. Woolliams).

VINCA - Periwinkle

Yellows (Callistephus virus 1). Symptoms were severe on 8 plants of V. rosea in the laboratory disease garden, Fredericton, N.B. (D.J. MacLeod).

VIOLA

Rust (Puccinia Violae) caused severe damage in a commercial planting of pansies, V. tricolor var. hortensis, at North Saanich, B.C. (W. Jones).

ZINNIA

Blossom Blight (?Choanephora sp.). C. sp. was associated with blossom blight specimens received from a garden in Montreal, Que. (J.E. Jacques).

Yellows (Callistephus virus 1). A trace was found in a bed at the University, Saskatoon, Sask. (T.C. Vanterpool). A few infected plants were sent in by the Forest Ranger Service from Reddit, Ont. (I.L. Conners). Infection was 10% in a bed at the Station, Fredericton, N.B. (D.J. MacLeod).

INDEX OF HOSTS

Abies 94
Acer 94
Achillea 98
Aconitum 100
Aesculus 94
Alfalfa 19
Althaea 100
Amelanchier 94
Anthirrhinum 100
Apple 77
Apricot 82
Aquilegia 101
Asparagus 38
Aster 101

Barley 9
Bean 38
Bean, Broad 40
Beet 40
Beet, Sugar 33
Begonia 101
Berberis 102
Betula 94
Blackberry 88
Blueberry 90
Boltonia 102
Boysenberry 88
Buckwheat 24

Cabbage 41
Calendula 102
Callistephus 102
Campanula 102
Carrot 41
Cauliflower 43
Celery 44
Cherry 82
Chives 44
Chrysanthemum 102
Clover, Common 23
Clover, Sweet 22

Coreopsis 103
Corn 25
Corn, Sweet 70
Corylus 95
Cotoneaster 95
Crataegus 95
Cucumber 45
Currant 87
Cyclamen 103

Dahlia 103
Daphne 103
Delphinium 103
Dianthus 103
Dimorphotheca 104

Eggplant 46
Erigeron 104
Eschscholzia 104

Flax 26
Fraxinus 96

Gaillardia 104
Garlic 46
Ginseng 47
Gladiolus 104
Godetia 105
Gooseberry 87
Grape 90
Grasses, Cultivated 36

Helianthus 106
Helichrysum 106
Hyacinthus 106
Hydrangea 106

Iris 106

Juglans 96
Juniperus 96